

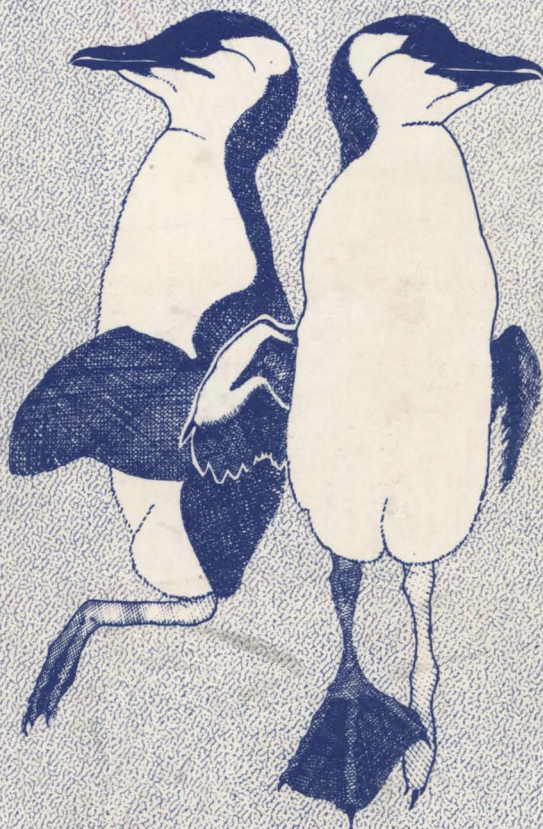
Gulf of the Farallones National Marine Sanctuary

1443 - CX - 8140 - 93 -011

JULY 1994

Beached Marine Birds and Mammals of the North American West Coast:

**A REVISED GUIDE TO THEIR CENSUS AND IDENTIFICATION, WITH
SUPPLEMENTAL KEYS TO BEACHED SEA TURTLES AND SHARKS**



**SHELVE IN
GOVERNMENT
DOCUMENTS**

BARCODE
INSIDE

NOAA Sanctuaries and Reserves Division

U.S. Department of Commerce

the
evergreen
state
college
library
olympia, washington 98506



In January 1981, the Gulf of the Farallones National Marine Sanctuary was one of the first National Marine Sanctuaries designated in the United States. The sanctuary shoreline boundary extends from Marin County to Bodega Head and includes the waters surrounding the Farallon Islands. It extends from the coast to 40 miles offshore and covers an area of 948 square nautical miles.

In the Gulf of the Farallones National Marine Sanctuary, gusting winds, ocean currents and the rotation of the earth combine each spring and summer to produce an explosion of marine life. The waters just beyond California's famous Golden Gate Bridge are home to a wide variety of marine mammals, seabirds, invertebrates, and fish. California's largest breeding population of harbor seals lives there along with California sea lions, elephant seals, and Steller sea lions. Blue and humpback whales migrate to the sanctuary to feed during the summer and fall. The Farallon Islands are home to the largest concentration of breeding seabirds in the continental United States.

Within the Gulf of the Farallones National Marine Sanctuary are nurseries and spawning grounds for commercially valuable species such as Dungeness crab, Pacific herring, and rockfish. Because the sanctuary boundaries include the coastline up to the mean high tide, a number of accessible lagoons, estuaries, bays and beaches are protected for public recreation. The sanctuary staff manages and protects these resources through monitoring, research and education programs.

The revision of this book was made possible through funding from the Gulf of the Farallones National Marine Sanctuary. This project was developed and supervised by Jan Roletto, Sanctuary Research Coordinator and Ed Ueber, Sanctuary Manager.

THE EVERGREEN STATE COLLEGE



A30000 575507



**BEACHED MARINE BIRDS AND MAMMALS
OF THE
NORTH AMERICAN WEST COAST:**

**A REVISED GUIDE TO THEIR CENSUS AND IDENTIFICATION,
WITH SUPPLEMENTAL KEYS TO BEACHED SEA TURTLES AND SHARKS**

by

D.G. Ainley¹, R.E. Jones², R. Stallcup¹, D.J. Long³, G.W. Page¹,
L.T. Jones⁴, L.E. Stenzel¹, R.L. LeValley¹ and L.B. Spear¹

with drawings by S. Webb¹, H.C. Strong¹ and D.J. Long³

¹PRBO International Biological Research
Stinson Beach, California 94970

²Museum of Vertebrate Zoology
University of California
Berkeley, California 94720

³Department of Integrative Biology
University of California
Berkeley, California 94720

⁴Department of Birds and Mammals
California Academy of Sciences
San Francisco, California 94118

Contract No. 1443-CX-8140-93-011
National Oceanic and Atmospheric Administration
Gulf of the Farallones National Marine Sanctuary
Fort Mason, Building 201
San Francisco CA 94123

94-224456

TABLE OF CONTENTS

	Page
List of Figures	vi
List of Plates	vii
INTRODUCTION	1
The Design of Beach Surveys	1
Recording Survey Data	4
USE OF THIS GUIDE	7
MARINE BIRDS	9
Measurements of Marine Birds	9
Glossary of Terms	13
Key to Bird Keys	21
Loons	29
Grebbs	29
Albatrosses	30
Petrels	31
Boobies	36
Cormorants	37
Waterfowl	39
Shorebirds	47
Skuas and Jaegers	55
Gulls	55
Terns and Skimmers	65
Alcids	69
Plates	76
Species Accounts	125
Books and Articles with Additional Information on Marine Birds	161
MARINE MAMMALS	164
Measurements and Glossary of Terms	164
Keys to Marine Mammals	170
Pinnipeds and Sea Otters	172
Plates	180
Cetaceans	182
Species Accounts	191
Books and Articles with Additional Information on Marine Mammals	196

SEA TURTLES	200
Glossary of Terms	200
Key to Sea Turtles	201
Plates	203
Species Accounts	202
Books and Articles with Additional Information on Sea Turtles	204
SHARKS AND RAYS	205
Glossary of Terms	205
Key to Abundant Coastal Sharks and Rays	206
Plates	210
Species Accounts	215
Books and Articles with Additional Information on Sharks and Rays	220
ACKNOWLEDGEMENTS	222
INDEX TO SPECIES	223
Birds	223
Marine Mammals	232
Sea Turtles, Sharks and Rays	234

LIST OF FIGURES

	Page
1. Example of a beached bird census form.	6
2. Measuring bill or culmen length.	9
3. Measuring tarsus and toe length.	10
4. Morphology of the upperwing and underwing.	11
5. Measuring wing length (wing chord).	12
6. Measuring the chord of the nail in a skua.	13
7. Cross-sectional shapes of body parts, in this case bills.	14
8. Several parts of a bird's bill.	14
9. Shapes of primary feathers.	15
10. The morphology of a bird's body.	16
11. The mantle.	17
12. The different kinds of neck collars.	18
13. Scutellate (a) compared to reticulate (b) scales on the tarsus.	19
14. The speculum.	19
15. Subterminal bands.	20
16. Windows in gull primary feathers.	20
17. A booby's or frigatebird's comb-like toenail (approximately natural size).	21
18. The curvature in the outer edge of the partly folded wing.	28
19. Storm-petrel tails.	33
20. The length of uppertail coverts (rump feathers) relative to the length of the tail: tail coverts a) about 1/2 the tail length and (b) about 2/3 the tail length.	33
21. Shorebird wings showing the (a) presence (Ruddy Turnstone) or (b) absence (Pectoral Sandpiper) of a wing stripe; (c) underside of a Dunlin wing showing wrist markings.	48
22. Contrast patterns of shorebird feathers.	52
23. Outer three primaries of the Common Black-headed Gull.	56
24. Color patterning in the extended wings of (a) immature Black-legged Kittiwake and (b) immature Bonaparte's Gull, and (c) immature Sabine's Gull.	57
25. Contrast patterns of outer primaries in terns.	68
26. Murre chick old enough to accompany adult at sea; natural size (1/3 the size of an adult) for comparison with Figure 27.	70
27. Ancient Murrelet and head of Xantus' Murrelet (a, <i>S. h. hypoleucus</i> and b, <i>S. h. scrippsi</i>); natural size, for comparison with Figure 26.	71
28. Some baleen whale terms used in the keys.	166
29. Some cetacean terms used in the key with a shark for comparison.	167
30. Measurements used in the cetacean keys.	167
31. Some parts of a pinniped skull.	168
32. Dorsal view of a pinniped skull.	169
33. Some morphological differences between eared seals (sea lions and fur seals) and earless seals (true seals).	170
34. Some morphological differences between male and female pinnipeds.	172

LIST OF FIGURES (Continued)

35.	Sea lion skull comparisons.	173
36.	Differences between California and Steller seal lion skulls and bacula.	174
37.	Fur seal head comparisons.	176
38.	Seal skull comparisons; ventral view.	177
39.	Skull of a northern sea otter.	179
40.	Skull of a small toothed whale (porpoise).	186
41.	Some morphological differences between male and female cetaceans.	187
42.	Position of the cloaca in male and female turtles.	201

LIST OF PLATES

1.	Bills of large loons.	76
2.	Bills of small loons and grebes.	77
3.	Bills of albatrosses.	78
4.	Bills of albatrosses, frigatebirds and tropicbirds.	79
5.	Bills of fulmarine petrels; and a top view comparison of representative petrel bills.	80
6.	Bills of shearwaters.	81
7.	Bills of storm-petrels.	82
8.	Bills of boobies.	83
9.	Bills of adults cormorants.	84
10.	Bills of juvenile cormorants.	85
11.	Bills of swans.	86
12a.	Bills of geese.	87
b.	Bills of geese.	88
13a.	Bills of dabbling ducks - top view.	89
b.	Bills of dabbling ducks - side view.	90
14a.	Bills of dabbling ducks and bay ducks - top view.	91
b.	Bills of dabbling ducks and bay ducks - side view.	92
15a.	Bills of bay ducks and Oldsquaw - top view.	93
b.	Bills of bay ducks and Oldsquaw - side view.	94
16.	Bills of scoters - side view.	95
17.	Bills of eiders - side view.	96
18.	Bills of scoters and eiders - top view.	97
19.	Bills of mergansers and coots.	98
20.	Bills of plovers.	99
21.	Bills of oystercatchers, phalaropes, turnstones and surfbirds.	100
22.	Bills of medium-sized sandpipers.	101
23.	Bills of large sandpipers.	102

LIST OF PLATES (Continued)

24.	Bills of small sandpipers.	103
25.	Bills of skuas and jaegers.	104
26a.	Bills of large gulls.	105
b.	Bills of large gulls.	106
27.	Bills of medium-sized gulls.	107
28.	Bills of small gulls.	108
29.	Bills of large terns and skimmers.	109
30.	Bills of small terns.	110
31.	Bills of large auks.	111
32.	Bills of puffins.	112
33.	Bills of murrelets and auklets.	113
34.	A large and long webbed foot (in this case, Pacific Loon).	114
35.	Webbed feet; three toes webbed, fourth toe minute:	
	1. South Polar Skua;	
	2. Northern Fulmar;	
	3. Western Gull.	115
36.	Webbed feet:	
	1 & 2. Three toes webbed, fourth toe absent (in this case, Pigeon Guillemot);	
	3. Three toes webbed, fourth toe lobed (in this case, Surf Scoter);	
	4. Four toes webbed (in this case, Brandt's Cormorant).	116
37.	Feet incompletely webbed, lobed, or not webbed:	
	1. Oystercatcher - partly webbed;	
	2. Black Tern - partly webbed;	
	3. Shorebird - not webbed;	
	4. Coot - lobed;	
	5. Grebe - lobed;	
	6. Phalarope - lobed.	117
38a-f.	Sterna of selected species of seabirds.	118-124
39a-b.	Pinniped bacula.	180-181
40.	Sea turtles of the eastern North Pacific Ocean.	202
41a-e.	Shark and ray species (showing tooth shape for selected species) most likely to be found on Pacific coast beaches.	210-214

INTRODUCTION

Much can be learned about the natural history of marine birds, mammals and turtles through the systematic study of beach-cast specimens. The first step in such investigations is the correct identification of the carcasses and to that end this manual was prepared. Identifying a dead animal presents problems different from those confronted when identifying a live one. For the latter, many field guides exist but they emphasize characteristics of behavior and morphology observable from a distance. When one is confronted with a dead animal, close at hand, such clues are no longer useful. This manual contains the necessary clues to identify dead marine birds, mammals, sharks (and rays), and sea turtles that frequent waters along the North American west coast.

The beach-cast specimen, or systematically derived information on occurrence rates of such specimens, can provide insight into a species' anatomy, physiology, diet, diseases, natural/unnatural causes of mortality, and other aspects of its natural history. In cases of rare, endangered or infrequently encountered species, a beach-cast specimen becomes an invaluable source of information that would otherwise be impossible to collect. In the cases of more abundant species, still more can be learned by accumulating over the long term, carefully tabulated records of beach-cast carcasses. As a start, the seasonal patterns of occurrence are revealed. Taken with environmental information, large yearly differences in occurrence patterns help to indicate the factors that affect the distribution of marine species. Similar information can be gathered by direct at-sea observations. This, however, is an extremely expensive and time-consuming operation, so much so that only one or two years of direct censuses are usually possible. At-sea observations are also much more difficult to repeat and standardize. The two activities though are complementary because the direct censuses serve to calibrate the beach surveys, both of which after all provide largely an *index* to a species occurrence and abundance. Standardization of the effort to derive the index is the critical factor; with carefully controlled standardization, the index becomes a valuable tool.

THE DESIGN OF BEACH SURVEYS

Systematic censuses of carcasses on a beach or beaches can yield surprisingly interesting and useful information. To be systematic, censuses need to be made of the same stretch of beach at regular intervals over an extended period. So useful is the information that major projects have been conducted in the United States, Great Britain, New Zealand and Australia. In some cases, the projects have been conducted by government wildlife department personnel and in others by private institutions using volunteer workers. The information gathered is extremely useful in the conservation of marine animals, as well as to increase our knowledge about them. The information has also become useful in assessing the mortality of animals due, unfortunately, to man's activities, for instance, in the case of oil spills and net entanglement. For example, it was

information gathered in the Beach Survey Program conducted by PRBO, through a volunteer network, that alerted the public and responsible agencies to extensive marine bird and mammal mortality, brought by coastal gill netting in the early 1980's.

Materials Needed. Besides being suitably attired, one should take the following items on a beach survey:

- Small back-pack;
- Pad & pencil(s);
- Plastic bags - large ones for carcasses whose identification needs confirmation;
Aluminum foil - for samples of oil, etc.;
- Scissors - for clipping feathers;
- Jack-knife - for a multitude of reasons;
- Metric tape measure or ruler;
- Field guides and identification manuals;
- Collection permits (otherwise leave specimens where they lie).

Standardization. Standardization of beach surveys has two parts, *search effort* and *species identification*.

The first critical element of standardization involves search effort; search effort should be the same on all surveys. The elements of search effort include a) the section of beach surveyed, b) the temporal regularity of surveys and c) the way in which the surveyor searches for carcasses each time.

The *same* stretch of beach must be surveyed at *regular* intervals. In this way one will derive an index of which animals have occurred, when they occur, and in what abundance. One can not search one kilometer of a beach one time and the next time only 0.5 km, or on a 5 km long beach, search the first kilometer one time and the last the next. The same starting and ending point should always be used on each survey of a particular beach. It will soon become apparent to beach surveyors, that one is more likely to encounter interesting beach-cast items and carcasses in particular stretches with other stretches usually devoid of items. Often this has to do with the slope of the beach or orientation relative to prevailing currents or winds. Thus, changing the length of survey from date to date can affect survey results importantly. If an entire beach can not be included in a regular survey, the surveyor should gauge what length is well within his/her walking capabilities. In that way, surveying the beach will not become a physical burden, thus, ensuring greater likelihood that a regular schedule, and a regularly surveyed stretch of beach, will be maintained.

To record all animals that wash in on any particular beach, one would have to survey constantly, at least every day, which is an impractical alternative. On the basis of PRBO data gathered over a 14-year period in central California, the intervals should be no less frequent than once every 2 weeks. Once per month is the absolute minimum, but substantial information can be lost even on this schedule. If more than one beach is part of a network, with the purpose of gaining a regional perspective to the factors that bring dead creatures to the beach, then all

beaches should be surveyed on or very close to the same date. The temporal interval should be regular to increase the ease and validity of between date or between beach comparisons. Also, if a die-off is detected (i.e. a large number of carcasses begin to appear for whatever reason, e.g. an oil spill), then often it becomes necessary to increase survey frequency in order to better quantify the phenomenon. After oil spills, beaches are usually surveyed daily or at every low tide (sometimes twice daily). Calculations can be made to relate occurrence frequency during these events to normal occurrence frequency determined on beach surveys, if the latter were indeed *regular*. Otherwise, this extrapolation is not possible. A valid extrapolation and estimate of the total numbers of animals killed by the oil (or other anthropogenic factor) becomes important in the litigation that follows.

When surveying, look for carcasses between and in the highest and the lowest tide lines. Most carcasses will be among the drift lines of flotsam that occur parallel to the water's edge. One has to walk (or drive) in a zig-zag pattern between the two lines to ensure adequate coverage. One can use a binocular sometimes to inspect an object (to determine whether or not it is an animal), thereby, reducing the need to zig or zag. A binocular is usually not useful on occasions where a lot of flotsam has accumulated on the beach. Often, carcasses will be entangled in kelp and seaweed, thus, one has to spread out such piles as one progresses. You will find the fewest specimens on the hard sand at the water's edge.

Each animal encountered is identified to species and then marked, disposed of or cast into the dunes so as not to be counted on the next survey. Marking can entail clipping the toe nails (preferred), clipping wing feathers or cutting flukes in certain ways (specific to the date of survey). One could also apply a bit of colored tape to a convenient body part.

Many museums very much want to acquire specimens. Thus, in some cases removal might entail transport of carcasses to a museum. In the case of any marine mammal and any endangered or protected species removal is unlawful without a permit; in these cases, one should notify a local museum or responsible government agency (for example, federal- or state-beach rangers or marine sanctuary employees, if applicable) of the animals' whereabouts. Enforcement of these laws is strict. Since it is technically unlawful to possess *any* migratory bird, mammal or sea turtle specimen without a federal permit, it is best to be associated, if only in a verbal agreement, with an institution that has such a permit. You will, of course, have to turn over specimens to that institution. The knowledge gained from beached bird and mammal censuses is, thus, further increased when the specimens provided to museums become available for future study.

The second integral part of standardization is assurance that carcasses are correctly identified. Identifying a dead animal presents problems different from those confronted when identifying a live one. For the latter, many field guides exist but they depend to a great extent on knowledge of behavior and on characteristics observable from a distance. When confronted with a dead animal, close at hand such clues are no longer useful, and characteristics of the animal not evident at a distance become apparent. When one reviews possible species in a field guide, looking on the basis of these close-at-hand characters, confusion sets in. With experience,

one learns which species are most likely, and the important characteristics to determine identity. When familiarity with these is gained, then the presence of unusual species stand out quickly.

Learning to identify carcasses is the single most difficult attribute to acquire for anyone interested in conducting beach surveys. To acquire the skill requires time on the beach under the supervision of a knowledgeable person. Obviously beach data can not be considered standardized unless all surveys are conducted by persons trained in species identification.

RECORDING SURVEY DATA

Figure 1 gives an example of a form for recording census data. Its use makes analysis of data at a later date much easier.

Location, date and observer. These details are written at the top of the form. The specific boundaries of the surveyed stretch should be described rather than just writing the beach name. Names and addresses of surveyors are useful in the event that more information is required at a later date. General observations can be written on the back of the form.

Species identification. Never guess at a species' identification. If one does not know, indicate this and specify identity as close as possible (e.g., "loon" is better than "unknown bird", "Red-throated or Pacific loon" is better still, i.e. you have it keyed it down to one or the other). If convenient bring the specimen to someone better able to make an identification. This is also a good way to learn. If not convenient, make a sketch giving special emphasis to body proportions (the head, if present, wing, flipper, fluke shapes etc.) and color patterns.

Carcass condition. It is useful to record whether or not the carcass is fresh, decomposing or dried/decomposed. This information provides an indication of how long the specimen has been on the beach. Carcasses can also be fresh but showing signs of being scavenged (by dogs, racoons, ravens, vultures, etc.). For example, scavenged carcasses can have a whole pecked in the back or the skin turned inside-out; in extreme cases, a fresh carcass can be reduced quickly to bones (note if there is any fresh flesh attached). So, note "fresh-scavenged," if that is the case. A column on the form asks for notes on carcass condition.

Age and sex. The fact that animals grow can play havoc with persons inexperienced in making species identifications. More simple circumstances are presented when color patterns change with age or sex, as they do in many ducks. For most marine birds, age and sex can not be determined on the basis of superficial characters; determining age is a subset of species identification and can come only with experience. For other creatures, such as mammals and sharks, determining sex is easy but determining age is, again, difficult unless the specimen is a subadult (and is, therefore, small).

Oiled. If a carcass is oiled, it is important to estimate the proportion of the body covered and the location of the oil. This information can be used to gauge whether or not the oil may

have contributed to this animals' death. A spot of oil on a bird's wing was likely not a cause of death and may have been added after the carcass sloshed around in the water.

It is possible that diatoms (microscopic algae) can grow on the plumage of some seabirds that spend many months at sea. Often, these growths become dark stains on the plumage that look like oil when wet (when dried, the stain becomes green). If one is not sure, collect a silver-dollar sized ball of the stained feathers and wrap in aluminum foil. One should also collect oil samples and turn them over to the U. S. Coast Guard as oil can be "typed" and traced to certain sources. Consult a park ranger if you are on a state or federal beach.

Toes clipped. This was explained above, page three.

Cause of death. Most carcasses will not show any signs from which one might deduce cause of death. In a few cases, cause of death will be obvious, e.g. entangled in plastic line or net, choked on a fish (or other item), shot, broken wing.

Figure 1. Example of a beach bird census form.

BEACHED BIRD CENSUS FORM

Page No. of

Date: _____ Beach Segment No: _____ Segment Name: _____

N. Boundary: _____ S. Boundary: _____

General beach condition/weather/census remarks: _____

Toe clip pattern: _____

Observers: 1 _____ 2 _____

Bird No.	Species Name	Condition	Age	Sex	Oiled?	Oil type	Oil extent	Where oiled	Scav.?	Toes Clipped?	Cause of death
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

CODES:

Condition: 0 (alive-active); 1 (alive-unresponsive); 2 (fresh dead); 3 (decomposing); 4 (dried bones/feathers); U (unknown).

Age: HY, AHY, FY, SY, TY, etc. (hatching, after-hatching, first, second, third year, etc.); IM (immature); AD (adult); U (unknown).

Sex: F (female); M (male); U (unknown).

Oiled: Y (yes); N (no); U (unknown).

Oil type: 1 (heavy); 2 (light); 3 (sheen only); 4 (smell only); U (unknown).

Oil extent: 1 (small globules, <2% of body); 2 (2-33% of body); 3 (33-66% of body); 4 (66-100% of body).

Where oiled: 1 (dorsal only); 2 (ventral only); 3 (entire body); 4 (head only); 5 (feet only); 6 (wings only); 7 (other).

Scavenged: Y (yes); N (no); U (unknown).

Other causes of death: 1 (shot); 2 (tangled in fishing line); 3 (tangled in plastic); 4 (other).

Toes Clipped: If the carcass has been found for the first time indicated with N for new; otherwise record which toes have been clipped previously on each foot.

If more than one page is required for a single census, use additional pages numbered 2, 3, etc. and repeat date and beach name at top of each additional page.

USE OF THIS GUIDE

This guide discusses the identification of most species of marine birds, mammals, sea turtles, sharks and rays that occur in coastal marine waters, and are known to occur dead on adjacent beaches, from the Bering Strait, Alaska, along the Pacific coast of North America south to Cabo San Lucas, which is the southern tip of Baja California, Mexico. It even includes most, but not all of the species known to have occurred only one or two times in this area. It does not include many of the Asian species that have occurred in the central and western Aleutian Islands. We include keys to sharks, because sharks can be large, can be found on beaches and, in a decomposed state, often are confused with small cetaceans.

The first bird keys and the first part of the mammal, sea turtle or shark and ray keys are extremely important, as these identify the major group or family to which an animal belongs. In the Key to Bird Keys you will be directed to use another set of keys. There are, however, several species that key out only in the Key to Bird Keys section. You initially have one of four bird keys to consult depending on the size (wing length) of the specimen. In these keys and those to which one is then directed (and throughout this manual), one is always given two choices, for example, 1 and 1'. To decide which choice best fits the animal being identified, **ALWAYS READ BOTH CHOICES ENTIRELY**. Following each choice will be a number that refers to the next choice to be considered or the species name of the animal, depending on how far along you are.

If you have difficulty in deciding which choice fits your animal, follow each choice through several additional steps in the key to see how other characters fit. Then make your initial choice. In some instances, you will only be able to key out an animal to two or more similar species.

Sometimes in a choice you will encounter two phrases separated by OR. The intended meaning is much stronger than a lower case "or." This means that within the choice, you are being given two or more GROUPS of characters, only one group of which will fit the specimen. Both phrases, separated by OR, cannot fit. If they do, something is not correct (perhaps you made a wrong choice earlier).

If you find a bird carcass with a head, and this is often the case, a collection of drawings is provided with which you match bill shape and size (Plates 1 - 33) by holding the bill up to the drawing. A WORD OF CAUTION: Please realize that slight variations in size and shape of bills are to be expected. IN CASES WHERE THERE IS OVERLAP THE DRAWINGS MAY GIVE YOU ONLY A GROUP OF SPECIES, and only a rough idea of the two or three most likely ones. For example, Glaucous and Glaucous-winged Gulls overlap in size to a great extent, and also overlap in size with several other species (Western, Herring, Thayer's Gulls). In many species, we provide small and large examples of each. Use the keys in conjunction with the drawings - DO NOT rely entirely on the drawings, especially when dealing with loons, storm-petrels, jaegers, gulls and terns.

If you find a bird carcass that has been scavenged it may be lacking parts that are necessary to use the keys. Usually, the sternum will be present (often enough one finds two wings joined by the shoulder bones -- wish bone and coracoids or collar bones -- and sternum). Plate 38 shows sterna from representative species. These should allow you to determine species group, after which the keys should become more useful.

As another aid to identification a section of Species Accounts is given after the keys, respectively, for each major group, birds, mammals, sea turtles and sharks/rays. These provide information on the usual timing and locality of occurrence, and in many cases some additional identifying characteristics. If you have any doubt about a bird carcass' identification, read the appropriate Species Account. Also, the key may instruct you to see Species Accounts. This usually means that you could also have found a species closely similar, but much more rare than the one to which the key has led.

MARINE BIRDS

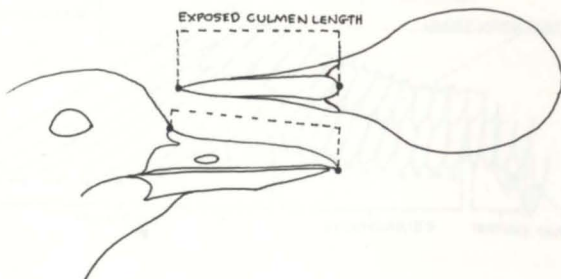
In this guide, marine birds include avian species that spend a significant part of their life cycle in contact with the marine environment. In more practical terms, the species included are those likely to occur dead on beaches in the prescribed geographic area. Not included are wading birds (herons, egrets, storks, etc.), waterfowl that rarely stray from freshwater, and rails (other than the American Coot). These birds very rarely occur dead on marine beaches; the same is true for almost any species of land bird. One should be especially aware that pigeons (Rock Doves), in fact, are found dead on beaches more often than many of the rarer marine species included in the key. As will be mentioned later, if you find a footless and headless pigeon specimen, you will likely try to key it out as a tern.

MEASUREMENTS OF MARINE BIRDS

Many choices require measurements of body parts in metric units. You will thus need a ruler, especially when size differences between two species are small. The ruler presented on the back cover will usually suffice but not always. Sometimes, the measurement is designed only to provide the general difference in size between species; that is, instead of stating in a choice that the carcass is "large" vs. "small" (very relative terms) we quantified the difference using real measurements. The measurements are taken as follows:

Bill (or culmen) length - the straight line distance from the bill's tip to where it ends at the skin or feathers of the forehead (Fig. 2); the culmen is actually the dorsal ridge of the bill. Some birds, e.g., cormorants, have bare skin where the bill reaches the forehead.

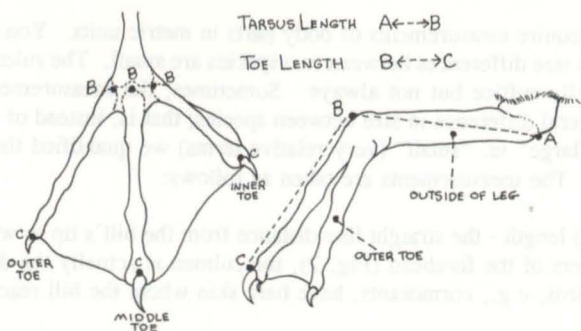
Figure 2. Measuring bill or culmen length.



Tarsus (plural - tarsi) length - the length of that bone (tarsometatarsus) connected to the bird's foot, from the outer edge of one joint (A) to the outer edge of the other (B) in Figure 3.

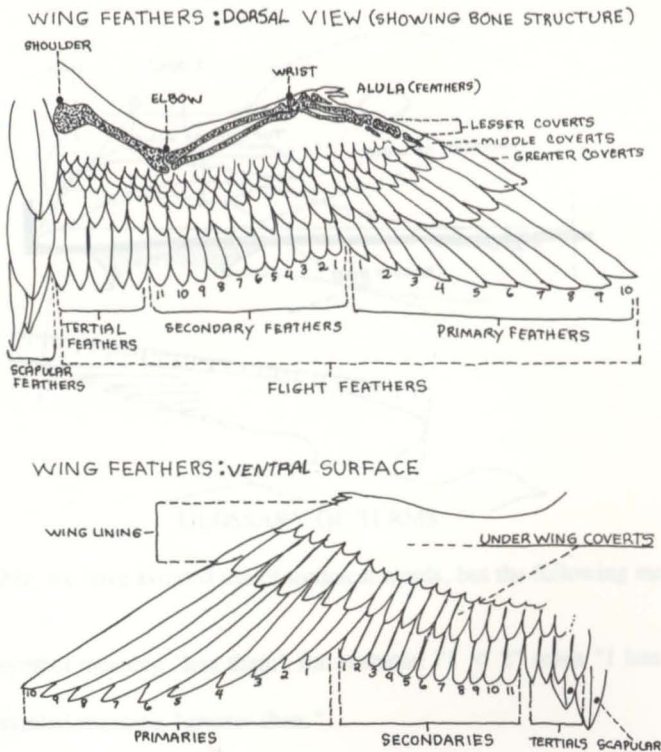
Toe length - the length of a straightened toe, from the tip (C) to the knuckle (B), as in Figure 3. The key will state whether to measure the inner, outer, or middle toe, or maybe just the longest toe. It should also state whether to include the nail in the measurement.

Figure 3. Measuring tarsus and toe length.



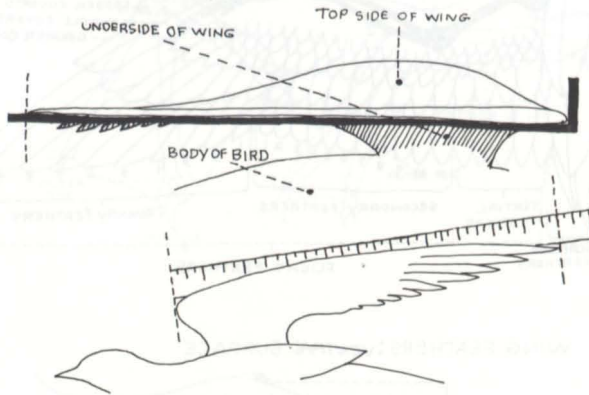
Total wing length - the distance from the shoulder or arm pit to the tip of the longest primary in the *extended* wing (Fig. 4). In conjunction with the width, taken across the wing's upper surface at the wrist (Fig. 4), a ratio of width to length is derived as an index to wing shape, i.e., long and narrow or short and broad.

Figure 4. Morphology of the upperwing and underwing.



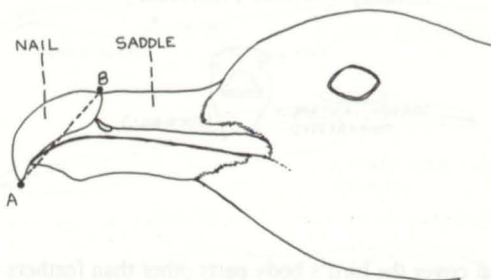
Wing chord (known also as wing length) - in a relaxed but folded wing, the distance from the wrist's outer edge to the tip of the longest primary feather (Fig. 5). The wing should be flattened against the ruler. Please note if one of the longest (outer) primary feathers is missing or is only partly regrown. If one of these feathers is missing, then wing length will be shorter than it should be in those species where the outermost primary is longest; the same would be true where the 9th primary is missing in a species where that is the longest feather (see Primaries in the Glossary of Terms).

Figure 5. Measuring wing length (wing chord).



Nail chord - the straight line distance from the point of the bill tip to where the nail's curvature ends (Fig. 6). The birds in which the bill sheath (outer surface of bill that covers internal bone) is divided into distinct sections, such as petrels, cormorants, jaegers and skuas (see Plates 3-10, 25), the nail is a distinct section. Some birds, such as alcids and terns, have no nail.

Figure 6. Measuring the chord of the nail in a skua.



GLOSSARY OF TERMS

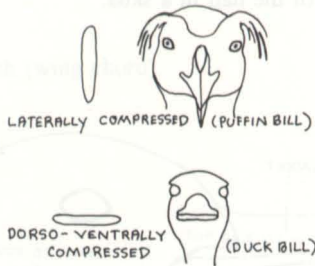
As much as possible, we have avoided use of technical words, but the following may need some explanations:

- < - a symbol meaning "less than;" for example: "1 < 2" reads "1 less than 2."
- > - a symbol meaning "greater than."

Bill saddle - the bill plate or section, shaped like a saddle, that sits on the culmen or posterior two-thirds of the bill in skuas, jaegers and other species (Fig. 6).

Compressed - refers to the shape of a part when viewed in cross-section (Fig. 7). Laterally compressed means the sides are flat, as in an oystercatcher's or puffin's bill or a loon's tarsus (see illustration of loon foot, Plate 34). Dorso-ventrally compressed means the top and bottom are flattened as in a duck's bill.

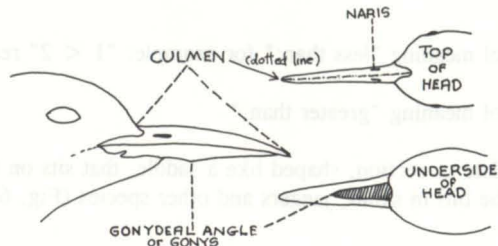
Figure 7. Cross-sectional shapes of body parts, in this case bills.



Contour feathers - those that cover the bird's body parts other than feathers of the wings and tail and down feathers.

Culmen - the uppermost ridge of the bill running from the bill's tip to where it meets the skin or feathers of the forehead. The culmen is thus a specific part of the upper bill (Fig. 8).

Figure 8. Several parts of a bird's bill; see also Figure 6.



Cut out - refers to the continuity in outline of a primary feather's edge (Fig. 9). A feather is composed of two webs attached to opposite sides of the shaft. The outer web is on the side away from the bird's body and is usually much narrower than the inner web; the inner web is on the side of the shaft toward the body.

Figure 9. Shapes of primary feathers.

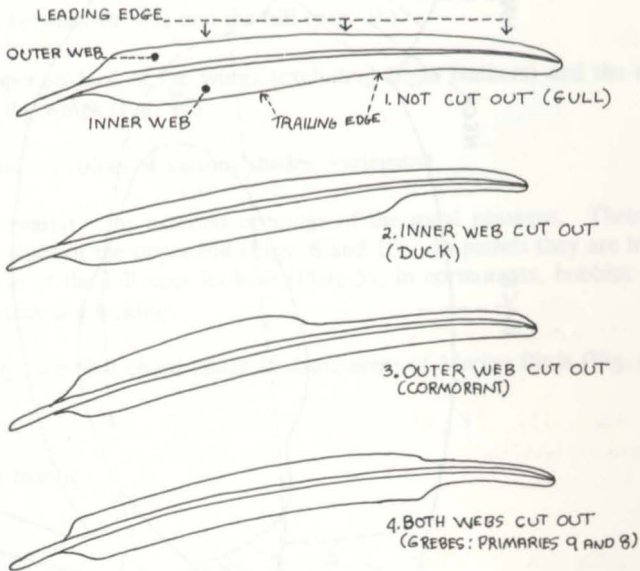
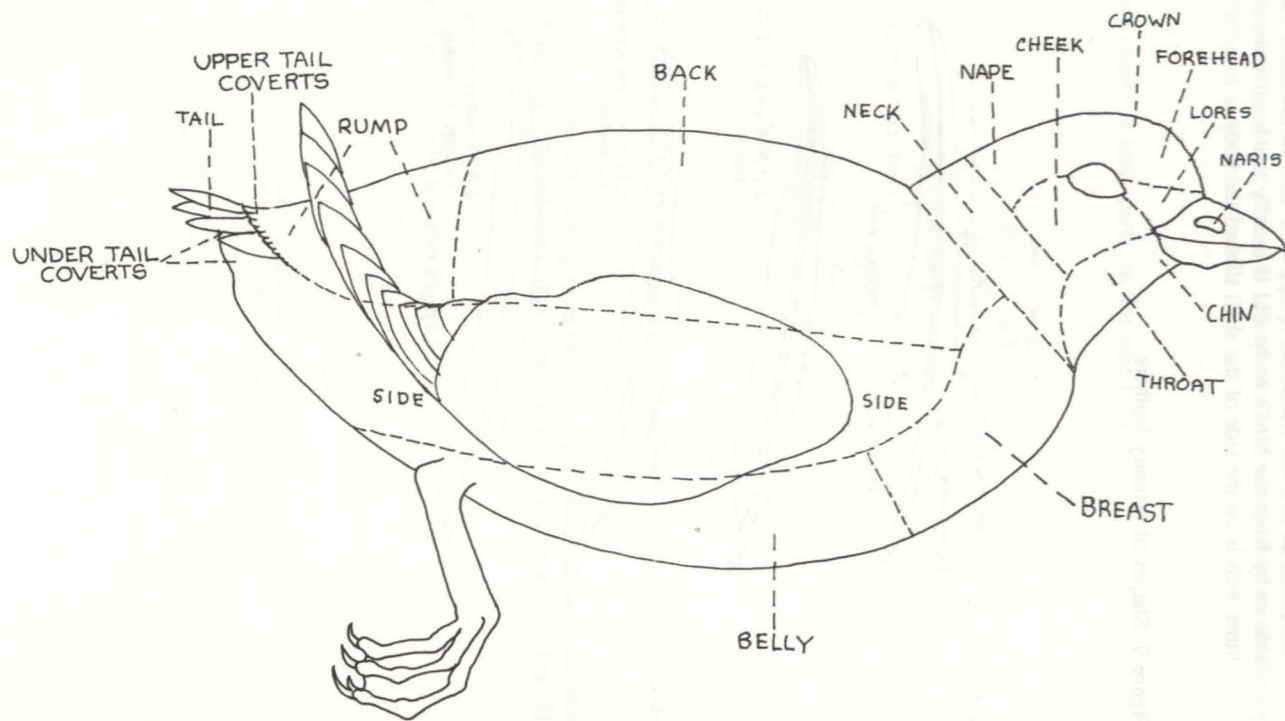


Figure 10. The morphology of a bird's body.



- Decurved - refers to a bill that curves downward, as in the Whimbrel (Plate 23).
- Down - the small fluffy feathers that lie beneath the covering of contour feathers.
- Flight feathers - the large wing feathers (primaries, secondaries and tertials) that provide lift during a bird's flight (Fig. 4). All bird species in this manual possess 10 primary feathers, unless the bird is molting (see Primaries).
- Gonys (or Gonydeal angle) - the ridge where the two sides of the lower mandible meet (Fig. 8).
- Laterally compressed - see Compressed (Fig. 7).
- Lores - the area between the eye and the bill (Fig. 10).
- Mantle - the upper surface of the wings (excluding flight feathers) and the area of the back between the wings (Fig. 11).
- Marbled - intermixed colors of various shades; variegated.
- Nares (singular, naris) - the external openings of the nasal passages. These are usually on opposite sides of the upper bill (Figs. 8 and 10). In petrels they are together in a tube on the top of the bill near its base (Plate 5); in cormorants, boobies and a few other species, they are lacking.
- Nail - the bill tip; see Nail chord under Measurements of Marine Birds (Fig. 6).

Figure 11. The mantle.



Neck collar - refers to coloration in the neck area (Fig. 12). A collar may be dark and complete (see A below), dark and incomplete (B), light and incomplete (C), or light and complete (D).

Figure 12. The different kinds of neck collars.

NECK COLLARS



A. DARK AND COMPLETE



C. LIGHT AND INCOMPLETE



B. DARK AND INCOMPLETE

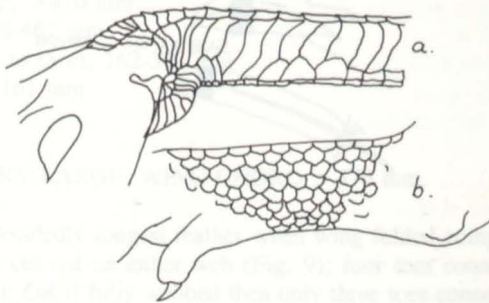


D. LIGHT AND COMPLETE

Primaries (or primary, singular) - the large flight feathers that are attached to wing bones from the wrist joint outward (Fig. 4). These are numbered from the wrist joint outward, 1 - 10 (see Flight feathers).

Reticulate - refers to the way in which scales of the legs are positioned; in this case, they do not overlap but rather meet each other as in the mesh of a net or as in the lines around the knuckles on a person's hands (Fig. 13).

Figure 13. Scutellate (a) compared to reticulate (b) scales on the tarsus.

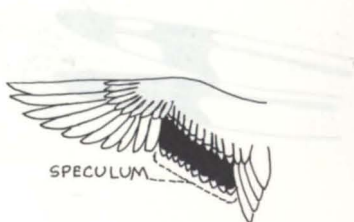


Scutellate - refers to the way in which scales of the legs are positioned, in this case overlapping as in shingles; see Reticulate (Fig. 13).

Secondaries (or secondary, singular) - those flight feathers that attach to wing bones between the wrist and elbow (Fig. 4). These are numbered from the wrist inward toward the body (see Flight feathers).

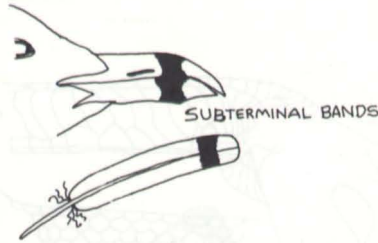
Speculum - in some ducks, the part of the wing (usually feathers of the secondaries) that in coloration, strikingly contrast with the remainder of the wing (Fig. 14).

Figure 14. The speculum.



Subterminal - usually refers to color patterning, in the area immediately adjacent to or before the tip. The dark colorations in Figure 15 are referred to as subterminal bands.

Figure 15. Subterminal bands.



Tertials (or tertial, singular) - those flight feathers attached to wing bones at the elbow joint. These are also considered to be the several innermost secondaries (Fig. 4). In some groups (ducks, shorebirds and terns) the tertials may be very long and pointed compared to the adjacent (outer) secondaries (see Flight feathers).

Underwing - the ventral or under surface of the wing; the wing surface that is facing downward in flight or is against the body when the wing is folded (Fig. 4).

Upperwing - the dorsal or upper surface of the wing; the wing surface that is facing upward in flight or is outermost when the wing is folded (Fig. 4).

Windows - the large white spots within the black area of a gull's wing tip (Fig. 16).

Figure 16. Windows in gull primary feathers.



KEY TO BIRD KEYS

If length of wing chord is:

use:

- | | |
|----------------------------------|--------|
| 1. Very long, >470 mm | Key A. |
| 2. Long, 338-467 mm | Key B. |
| 3. Moderate to short, 162-337 mm | Key C. |
| 4. Short, <161 mm | Key D. |

KEY A. SIZE VERY LARGE, WING CHORD >470 mm.

- 1 Primary 10 decidedly longest feather when wing folded completely in natural position; primaries not cut out on either web (Fig. 9); four toes connected by incomplete webs (Plate 37-1,2); OR if fully webbed then only three toes connected (Plates 35, 36-1,2,3) and scales on fore-edge of tarsi scutellate (Fig. 13). 2
- 1' Primary 10 not longest wing feather or equal in length to primary 9, primaries 10-8 may be cut out on one or both webs (Fig. 9); four toes connected by complete webs (Plate 36-4); OR if three toes webbed then scales on tarsi reticulate (Fig. 13). 7
- 2 Wing chord >600 mm; webbing incomplete, restricted to basal third of toes; nail on middle toe flared and comb-like (Fig. 17). 3
- 2' Wing chord <580 mm; three longest toes joined by full webs; no toenails comb-like. 5

Figure 17. A booby's or frigatebird's comb-like toenail.



KEY A (Continued)

- | | | |
|---|--|---------------------------|
| 3 | Belly (and remainder of plumage) black. | |
| | MAGNIFICENT FRIGATEBIRD, adult male (see Species Accounts) | |
| 3 | Belly (perhaps head and neck as well) white. | 4 |
| 4 | Head and neck black. | |
| | MAGNIFICENT FRIGATEBIRD, adult female (see Species Accounts) | |
| 4 | Head and neck white. | |
| | MAGNIFICENT FRIGATEBIRD, immature (see Species Accounts) | |
| 5 | Tarsi compressed or flattened laterally in cross section (Plate 34); tail feathers very short, 16-20 in number. | See LOONS (Page 29) |
| 5 | Tarsi rounded in cross section; tail feathers long, 12 in number. | 6 |
| 6 | Very large; wing chord >474 mm; distance from shoulder to wrist much longer than from wrist to tip of primaries; foot longer than tarsus; tarsi >79 mm; more than 25 secondaries. | See ALBATROSSES (Page 30) |
| 6 | Wing chord <474 mm; distance from shoulder to wrist not decidedly longer than from wrist to tip of primaries; foot about equal in length to tarsus; tarsi <74 mm; 22 or fewer secondaries. | See GULLS (Page 55) |
| 7 | Primaries 10-7 decidedly cut out on outer web (check at least 2/3 of the feather length), inner web tapering gradually to tip (Fig. 9); 4 long toes connected by webs (Plate 36); scales on fore-edge of tarsi scutellate; more than 25 secondaries. | 8 |
| 7 | Primaries 10-8, and sometimes 7, cut out on inner web, outer web of 9 and sometimes 8 cut out also; only 3 toes of foot connected by webs, 4th toe reduced in size; scales on legs and feet reticulate; 22 or fewer secondaries. | See WATERFOWL (Page 39) |
| 8 | Wing white with dark primaries. | AMERICAN WHITE PELICAN |
| 8 | Wing entirely dark. | 9 |
| 9 | Belly white. | BROWN PELICAN, immature |
| 9 | Belly dark. | BROWN PELICAN, adult |

KEY B. SIZE LARGE, WING CHORD 338-469 mm.

- | | | |
|----|--|---------------------|
| 1 | Primary 10 longest wing feather. | 2 |
| 1' | Primary 10 shorter than 9 and usually shorter than 8. | 7 |
| 2 | All 4 toes long and connected by webs (Plate 36-4); middle toenail comb-like (Fig. 17).
See BOOBIES (Page 36) | |
| 2' | Only 3 toes connected by webs, 4th toe reduced in size (Plate 35); middle toenail not comb-like. | 3 |
| 3 | Tarsus flattened laterally in cross section (Plate 34); 16-20 tail feathers.
See LOONS (Page 29) | |
| 3' | Tarsus rounded in cross section; 12 tail feathers. | 4 |
| 4 | Wings entirely jet black on upper surface. | See TERNS (Page 65) |
| 4' | Wings not black on upper surface, wings white to gray or brown. | 5 |
| 5 | Wings long and thin in proportion when extended, ratio of width to total length 0.25 or less; tertials and scapulars very long - particularly evident in folded wing; distance from shoulder to wrist less than wrist to wing tip (Fig. 4); feet much longer than tarsi; tarsi short ($< 1/10$ wing length); tail deeply forked.
See TERNS (Page 65) | |
| 5' | Wings broader in proportion, ratio of width to total length 0.26 or (usually much) more; tertials and scapulars not unusually long; distance from shoulder to wrist about equal, OR slightly more than from wrist to wing tip; feet and tarsi about equal in length; tarsi long ($> 1/10$ wing length). | 6 |
| 6 | Wings very dark brown all over except for white shafts and bases to outer primaries; in some immatures, contour feathers may be spotted with white, giving bird, especially near flanks and rump, a pronounced checkered appearance; bill black (bill may be light near nostrils; in juveniles, bill may be blue-gray with a black tip); legs and feet black or legs blue and feet black; claws very long and deeply curved (Plate 35-1).
See SKUAS and JAEGERs (Page 55) | |
| 6' | Wings gray (charcoal to very light gray) and white; OR brown with white flecking throughout; OR if entirely brown (immature Heerman's Gull) than remainder of characters do not fit; in immatures, color of contour feathers does not give bird a boldly checkered appearance; legs, feet and bill not black; claws not deeply curved (Plate 35-3).
See GULLS (Page 55) | |

KEY B (Continued)

- 7 Feet with 4 long toes all joined by webs; 12 tail feathers. 8
- 7' Feet with 3 long toes joined by webs, 4th toe reduced in size; 14-24 tail feathers.
See WATERFOWL (Page 39)
- 8 Primary 10 only a few millimeters shorter than 9; only primary 10 cut out and that very slightly; tail decidedly wedge-shaped; bill serrated, not hooked at tip; middle toenail comb-like.
See BOOBIES (Page 36)
- 8' Primary 10 shorter than 8 or even 7; primaries 10-8 cut out on inner web; tail fan-shaped; bill deeply hooked at tip, not serrated along cutting edge; middle toenail not comb-like.
See CORMORANTS (Page 37)

KEY C. SIZE MODERATE TO SMALL, WING CHORD 162-337 mm.

- 1 At least 1 (or all) of the outer 5 primaries with inner, outer, OR both webs cut out (Fig. 9). 2
- 1' No webs of any primaries cut out. 7
- 2 Wings all of one color (black to brown) on upper surface. 3
- 2' Upperwings with definite contrasting color pattern, if only that some coverts may be white-tipped. 5
- 3 Extended wing broad and rounded; in folded wing primary 10 shorter than 8 or 7. 4
- 3' Extended wing more pointed; in folded wing primary 10 longest, OR at least longer than 8.
See WATERFOWL (Page 39)
- 4 Only primary 10 cut out; ratio of wing's width to total wing length is about 0.32 - 0.38; 3 toes connected by webbing, 4th toe lobed (Plate 36-3); 14-24 tail feathers.
See WATERFOWL (Page 39)
- 4' Primaries 10-8 cut out on inner web; wing very broad, ratio of width to total wing length is greater than 0.40; 4 toes connected by webbing (Plate 36-4); 12 tail feathers.
See CORMORANTS (Page 37)

KEY C (Continued)

- 5 Wing broad and rounded, outer edge of primaries recurved (Fig. 18); 12 primaries; outer 3 primaries in folded wing very close in length; webbing of primaries cut out near tip as follows: 10 on inner web, 9 and 8 on both webs (Fig. 9); no tail; toes broadly lobed but not joined by webbing (Plate 37-5). See GREBES (Page 29)
- 5' Wing pointed, 11 primaries, primary 10 definitely longest; OR 10 slightly shorter than or equal to 9; only primaries 10 and 9 cut out; OR if 8 included then cut outs subtle and that on 8 confined to outer web; tail present; feet with 3 webbed toes and a 4th toe reduced in size (Plates 34, 35, and 36-1, 2, 3). 6
- 6 Tips of some wing coverts edged with white - giving flecked appearance - otherwise upper surface of wing dark (almost black); primary 10 longest in folded wing; primaries 10-8 indistinctly cut out, 10 on inner web, 8 on outer and 9 on both; tarsi flattened laterally (Plate 34). See LOONS (Page 29)
- 6' Definite color pattern to wing, if only a single line of white produced by white tips of a row of feathers; primary 9 usually longest feather; tarsi rounded. See WATERFOWL (Page 39)
- 7 Primary 10 in folded wing equal in length to 6, primary 9 longest; wing rounded and stubby, the ratio of width to total length about 0.43; wing charcoal gray with white edge of outer primary; toes very long and lobed (Plate 37-4); bill white, chicken-like (Plate 19-5). AMERICAN COOT
- 7' Not as in 7. 8
- 8 Wings very long and slender when extended (Fig. 18), ratio of width to total length 0.23 -0.25; distance from wrist to tip of primaries 1 1/2 times the distance from wrist to shoulder; tarsi proportionately small, 1/10 the wing length; upper surface of wing silvery gray (with gray or brown edgings to coverts in immatures); OR black, whitish below. See TERNS (Page 65)
- 8' Proportions and colors in wings not as above; tarsi not so minute. 9
- 9 Wing stubby - lengths of outer two primaries about equal and not extending much beyond 8 or even 7; outer edge of folded wing curved in outline (Fig. 18); body feathers close and compact; only 3 toes, all joined by webs (Plate 36-1,2). See ALCIDS (Page 69)
- 9' Not as in 9; wings more pointed - if the tips of primaries 10 and 9 are about equal in extent, they extend decidedly beyond 8; folded wing not decidedly curved; 4 toes. 10

KEY C (Continued)

- 10 Tertials very long and pointed; feet webbed; OR only partly webbed; OR not webbed at all (compare Plates 35-37). 11
- 10 Tertials not projecting beyond other secondaries to any great extent; 2 toes, webbed their entire length. 12
- 11 Wing narrow, ratio of width to total length is 0.27-0.31; 12 tail feathers.
See SHOREBIRDS (Page 47)
- 11 Wing broader, ratio of width to length is 0.34-0.38; 12-24 tail feathers.
See WATERFOWL (Page 39)
- 12 Bird with distinctive musky odor (not that of rotting flesh!); nostrils together in a tube on top of bill (Plates 5 and 6); wings long and narrow, ratio of width to total length 0.22-0.29 or less.
See PETRELS (Page 31)
- 12 No distinctive odor; nostrils not as in 12; wing broader. 13
- 13 Feet with all 4 toes joined by webs (Plate 36-4); bill without nail or hook at tip; OR bill not duck-like; body and wing white all over except for feather tips on back and several outer primaries being black.
RED-BILLED TROPICBIRD
- 13 Not as in 13. 14
- 14 Upper surface of wing dark brown (sometimes with buffy edges to coverts) except for white bases and shafts of outer primaries; toes very long and toenails deeply hooked (Plate 35-1); legs blue and feet black.
See JAEGERs (Page 55)
- 14 Not as in 14. 15
- 15 Wing entirely black or dark brown, or black or dark brown with several white secondaries; 4th toe is lobed not webbed (Plate 36-3); outer of 3 webbed toes longest; 12-24 tail feathers.
See WATERFOWL (Page 39)
- 15 Wing color not as in 15; 4th toe neither webbed nor lobed (Plate 35-3); middle of 3 webbed toes longest; 12 tail feathers.
See GULLS (Page 55)

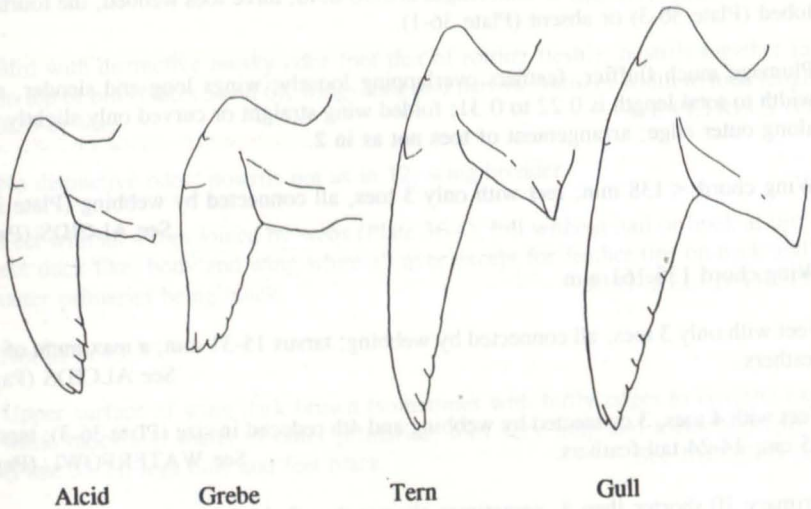
KEY D. SIZE SMALL, WING CHORD < 161 mm

- 1 Primaries 10-8 and sometimes 7 cut out on inner, outer or both webs (Fig. 9); 12 primaries; no tail; tarsi flattened laterally (Plate 37); viewed from above the outer edge of folded wing curves decidedly outward, away from body (Fig. 18).
See GREBES (Page 29)
- 1' Primaries not cut out or 10 and 9 only slightly so; 11 primaries (outermost often minute); prominent tail; tarsi rounded in cross section; shape of wing not as above. 2
- 2 Body plumage compact, feathers overlapping tightly; viewed from above, partly folded wings stubby and decidedly curved inward along outer edge (Fig. 18); wings rather broad, the ratio of width to total length is 0.30-0.40; three toes webbed, the fourth either lobed (Plate 36-3) or absent (Plate 36-1). 3
- 2' Plumage much fluffier, feathers overlapping loosely; wings long and slender, ratio of width to total length is 0.22 to 0.31; folded wing straight or curved only slightly inward along outer edge; arrangement of toes not as in 2. 5
- 3 Wing chord < 138 mm; feet with only 3 toes, all connected by webbing (Plate 36-2).
See ALCIDS (Page 69)
- 3' Wing chord 138-161 mm. 4
- 4 Feet with only 3 toes, all connected by webbing; tarsus 15-31 mm; a maximum of 12 tail feathers.
See ALCIDS (Page 69)
- 4' Feet with 4 toes, 3 connected by webbing and 4th reduced in size (Plate 36-3); tarsus 30-35 cm; 14-24 tail feathers.
See WATERFOWL (Page 39)
- 5 Primary 10 shorter than 8, sometimes shorter than 7; bird largely same color (gray or brown) all over except rump may be white; tertials not notably longer than other secondaries; distinctive musky smell pervades specimen.
See PETRELS (Page 31)
- 5' Primary 10 longest primary; usually a stripe running outward along upper surface of wing; belly and back, OR back, breast or wings checkered; tertials distinctly longer and more pointed than the secondary feathers; no distinctive musky odor. 6
- 6 Upper surface of wing silver-gray, sometimes with buffy edgings to coverts; exposed portion of outer few primaries darker than rest of wing; tarsi short, < 1/10 the wing length.
See TERNS (Page 65)

KEY D (Continued)

- 6' Wing color not as in 6; tarsi proportionately longer, $> 1/10$ the wing chord length.
See SHOREBIRDS (Page 47)

Figure 18. The curvature in the outer edge of the partly folded wing.



KEY TO LOONS

- 1 Bill length 45-58 mm; wing chord <316 mm (260-315); tarsus length 65-79 mm. 2
- 1' Bill 70-98 mm; wing chord >319 mm (320-395); tarsus usually >79 mm (73-97). 3
- 2 Bill stiletto-shaped, tip of culmen curved decidedly downward (Plate 2-3). In spring or summer, throat black with green or purple iridescence; back black, each side of upper mantle with column of rectangular white spots. In fall or winter, throat white, often with narrow dark chin-strap between throat and neck; eye in dark part of face; back blackish brown, sometimes a few scapular feathers with each having a pair of dull whitish spots.
PACIFIC LOON
- 2' Bill slender, appearing upturned due to (1) abrupt upward angulation of gonys (Fig. 8) and (2) a straight (perhaps slightly downcurved) or upward curved culmen especially along posterior two-thirds (Plate 2-2). In spring or summer, throat red; back blackish-brown, feathers at shoulder each with a pair of small gray spots at the tip. In fall or winter, throat white; eye in white part of face; back blackish-brown, but each feather has a pair of white spots at the tip.
RED-THROATED LOON
- 3 Culmen dark along entire (or almost entire) length; bill stiletto-shaped, culmen curved downward (Plate 1-1); central portion of ventral surface of outer 7 primaries light tan, bordered on either side with dark tan; viewed from the front, cross section of bill anterior to nostrils is rounded.
COMMON LOON
- 3' Culmen paler, horn color at tip and darkening toward base; culmen often straight, distal one-third of lower mandible with abrupt upward angle giving bill an upturned appearance (Plate 1-2); central portion of outer primaries on ventral surface creamy, bordered on either side by creamy to pale tan; viewed from the front, cross section of bill anterior to nostrils often flat-sided.
YELLOW-BILLED LOON

KEY TO GREBES

- 1 Wing chord >180 mm (181-215); bill longer than the head; OR bill >44 mm (45-79); tarsus >60 mm. 2
- 1' Wing chord <155 mm; bill shorter than the head; OR bill <30 mm; tarsus <45 mm. 5
- 2 Wings with white on inner primaries and outer secondaries; bill length >58 mm; scales on bottom of tarsus smooth; feet olive to yellow. 3

KEY TO GREBES (Continued)

- 2' Wings with no white on primaries, white only on secondaries; leading edge of inner wing white, from wrist to body; bill 45-56 mm; scales on bottom of tarsus pointed; feet dark brown. **RED-NECKED GREBE**
- 3 Bill yellow to orange throughout; black of cap not extending to lores; dark of back pale in color. **CLARK'S GREBE 4**
- 3' Bill yellowish green with blackish or darker culmen; black of cap extending below eye to lores; back quite dark. **WESTERN GREBE 4**
- 4 Bill stiletto-shaped (Plate 2-5), 67-80 mm long and 9.5-13.0 mm deep at anterior edge of nares; wing chord 192-214 mm. **CLARK'S or WESTERN GREBE, male**
- 4' Bill much more slender and upturned (Plate 2-6), 55-71 mm long and 8-11 mm deep; wing chord 184-203 mm. **CLARK'S or WESTERN GREBE, female**
- 5 Only a white spot at tip of inner web of outer secondaries or no white on secondaries; bill chicken-like (very deep and blunt), slightly hooked at tip (Plate 2-1); feathers on front of crown with bristle-like tips; outer lobes of toes narrow, webbing extending less than half the toe length. **PIED-BILLED GREBE**
- 5' Broad white areas on both webs of some secondaries; bill slender, not hooked at tip; feathers on crown without bristle-like tips; outer lobes of toes narrow, webbing extending less than half the toe length. **6**
- 6 Bill higher than wide at base; tarsus 44.5-49 mm. In winter, black of cap extending sharply only to level of eye; in breeding plumage, much of neck, upper breast and area along sides chestnut. **HORNED GREBE**
- 6' Width and height of bill at base equal, tip may be slightly upturned; tarsus 38-44.5 mm. In winter, dark of cap extending below eye; in breeding plumage, neck and upper breast black, some chestnut on flanks. **EARED GREBE**

KEY TO ALBATROSSES

- 1 Body, head and neck white or mottled white and dark brown. **2**
- 1' Entirely dark brown. **3**

KEY TO ALBATROSSES (Continued)

- 2 Area of back between wings white or mottled white and dark brown; culmen 120-145 mm; bill depth measured at anterior edge of nares, 34-35 mm; tarsus 91-101; wing chord 518-555 mm. SHORT-TAILED ALBATROSS, adult
- 2' Area of back between wings entirely dark; culmen 99-114 mm; bill depth 24-34 mm; tarsus 78-86 mm; wing chord 470-510 mm. LAYSAN ALBATROSS, adult and immature
- 3 Bill and feet pasty pink; measurements as in 2. SHORT-TAILED ALBATROSS, immature
- 3' Bill and feet black or dark brown, sometimes pinkish-horn at base; culmen 94-113 mm; bill depth 29-40 mm; tarsus 80-95 mm; wing chord 485-533 mm. 4
- 4 Considerable white on face. BLACK-FOOTED ALBATROSS, adult
- 4' No (or only a small amount of) white on face. BLACK-FOOTED ALBATROSS, immature, sub adult, or young adult

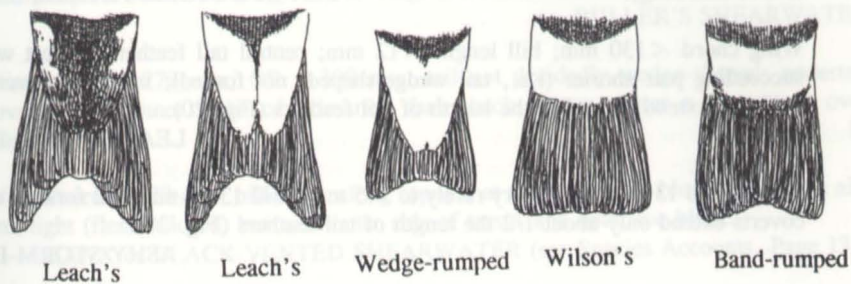
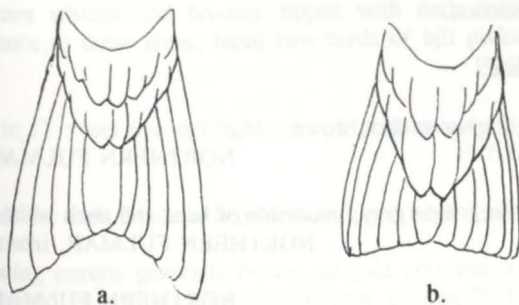
KEY TO PETRELS

- 1 Bill length < 18 mm; wing chord < 180 mm; tarsus < 30 mm; OR if 33-37 mm then feet with yellow on webs; tarsus decidedly longer than middle toe with claw (STORM-PETREL). 2
- 1' Bill > 25 mm; wing chord > 200 mm; tarsus > 38 mm; OR if 33-37 mm then feet are entirely black; tarsus not longer than middle toe with claw. 10
- 2 Body, head and neck light to medium bluish-gray; dorsal wing all gray but greater coverts blackish forming dark carpal bar; ventral wing gray, coverts black. FORK-TAILED STORM-PETREL
- 2' Body, head and neck blackish-gray to sooty brown, except for rump which may or may not be white (Fig. 19) and secondary upperwing coverts which may or may not be distinctly buffy or gray. 3
- 3 Wing chord > 165 mm; tarsus 29-33 mm but if close to 33 mm then feet entirely black and no white on rump. BLACK STORM-PETREL

KEY TO PETRELS (Continued)

- 3' Wing chord < 162 mm; tarsus 25-33 mm but if close to 33 mm then webs of feet with light (yellow) spots and with white feathers in rump, flanks and undertail coverts. 4
- 4 At least some white on some rump feathers (uppertail coverts; Fig. 19). 5
- 4' No white on any feathers of rump or flanks. 8
- 5 Tarsus > 30 mm; light (yellow) area on webs of feet; uppertail coverts all white, some and usually many undertail coverts also white (Fig. 19).
WILSON'S STORM-PETREL
- 5' Tarsus < 26 mm; feet entirely black; undertail coverts not white. 6
- 6 Uppertail coverts white to the tips including central two (feather shafts dark); lateral and undertail coverts black; tail short, longest tail feather (from skin to tip) 56-57 mm; longest (central) white rump feathers extend about 2/3 or more the length of the tail (Fig. 19); culmen often < 12.9 mm (10.6-14.0 mm).
WEDGE-RUMPED STORM-PETREL
- 6' Rump extensively white with most of the longer uppertail coverts in center of rump having dark tips except perhaps the most central ones which may sometimes be entirely white or entirely dark; OR only a few feathers on either side of rump have some white (sometimes confined to one white spot on one feather on either side); longest rump feathers extend only about 1/2 the tail length (Fig. 19). 7
- 7 Two central-most uppertail coverts within the largely white rump patch completely dark or partly dark (Fig. 19); OR only a few feathers on either side of rump with at least some white; shafts of white rump feathers usually dark, but if white, then only for about 1 cm.
LEACH'S STORM-PETREL, light phase
- 7' The several longest uppertail coverts in center of rump white but with dark tips (Fig. 19); shafts of white rump feathers white; lateral tail feathers white at base for 2.5 cm or more.
BAND-RUMPED STORM-PETREL
- 8 Coloration blackish-gray all over (not brown), particularly on ventral surfaces of wings; upperwing coverts not distinctly buffy (only slightly, if at all). 9

Figure 19. Storm-petrel tails.

Figure 20. The length of upper tail coverts (rump feathers) relative to the length of the tail: tail coverts (a) about $1/2$ the tail length and (b) about $2/3$ the tail length.

KEY TO PETRELS (Continued)

- 8 Coloration brown, particularly underwing coverts; upperwing coverts very decidedly buffy forming a bar running diagonally from the body to the wrist (not including the scapulars); north of Pt. Conception almost all with wing chords > 144 mm (very rarely to 142 mm long). LEACH'S STORM-PETREL, dark phase
- 9 Wing chord < 130 mm; bill length < 12 mm; central tail feathers longest with each succeeding pair shorter (i.e., tail wedge-shaped, not forked); uppertail covers (rump feathers) extend about $2/3$ the length of tail feathers (Fig. 20). LEAST STORM-PETREL
- 9 Wing chord 131-142 mm (very rarely to 145 mm); bill 13-15 mm; tail forked; uppertail coverts extend only about $1/2$ the length of tail feathers (Fig. 20). ASHY STORM-PETREL
- 10 Bill black, < 28 mm long and stubby in proportion (not slender, culmen length < 4 times depth, anterior to nares (Plate 5); tarsus < 38 mm (GADFLY PETREL). 20
- 10 Bill brown, yellow, horn color or pale, > 29 mm but if 29-30 mm then long and then (culmen length > 4 times the depth, anterior to nares); tarsus > 42 mm. 11
- 11 Bill large and thick; nasal tube prominent, about 40% of bill length (Plate 5); lower mandible not decidedly hooked at tip; body stocky; tarsus rounded in cross-section. 12
- 11 Bill slender (especially when viewed from above); nasal tube about 25% of bill length (Plate 6); lower mandible hooked; body slender, torpedo-shaped; tarsus flattened laterally when viewed in cross-section. 14
- 12 Underparts of body white. 13
- 12 Underparts of body light gray to dark brown. NORTHERN FULMAR, dark phase
- 13 Crown, nape and hind neck light gray; underside of head and neck white. NORTHERN FULMAR, intermediate phase
- 13 Head and neck white. NORTHERN FULMAR, light phase
- 14 Belly white or partly white. 15
- 14 Bird entirely dark, except bill and feet may not be dark. 18

KEY TO PETRELS (Continued)

- 15 Wing chord 270-300 mm; tail decidedly wedge-shaped; inner webs of primaries largely white; in fresh plumage, back light to medium gray, a prominent dark W pattern visible on mantle when both wings are extended (not evident in worn plumage) and, otherwise, all underparts white including ventral wings and tail coverts.

BULLER'S SHEARWATER

- 15' Wing chord <270 mm, OR >300 mm; tail not decidedly wedge-shaped; undertail coverts dark; inner webs of primaries dark; back brown, never a W pattern over mantle. 16

- 16 Wing chord <270 mm; bill black along top and at tip, remainder bluish-gray; legs and feet light (flesh-colored) but with outer side of tarsus and outer toe black.

MANX or BLACK-VENTED SHEARWATER (see Species Accounts, Page 131)

- 16' Wing chord >300 mm; bill largely straw-colored except darker along top and at tip; legs and feet entirely light (flesh-colored) but tending toward brown along outer toe. 17

- 17 Undertail coverts white; feathers of forehead, face and sides of neck white each with a central dark streak running along the shaft giving a streaked appearance to these areas; some or all uppertail coverts white forming a U against dark lower back and tail feathers; coloration of bill whitish to pasty pink.

STREAKED SHEARWATER

- 17' Undertail coverts dark; feathers of forehead, face and sides of neck usually dark but sometimes whitish and broadly tipped with dark coloration imparting a speckled appearance to these areas; basal two-thirds of bill pinkish (lighter than 17), dark at tip.

PINK-FOOTED SHEARWATER

- 18 Bill as in 17'; feet and legs light-colored (pinkish in fresh specimens); wing chord 298-333 mm.

FLESH-FOOTED SHEARWATER

- 18' Bill and feet dark (black to brownish or bluish); wing chord 263-320 mm. 19

- 19 Underwing coverts generally brown, or pale gray but not silvery-white as 19'; small compared to 19' (wing chord 263-290 mm, culmen 29-35 mm).

SHORT-TAILED SHEARWATER

- 19' Underwing coverts usually silvery-white, in some cases almost white; larger (wing chord 280-320 mm; culmen 38-48 mm).

SOOTY SHEARWATER

KEY TO PETRELS (Continued)

- 20 Coloration dark gray all over, perhaps some white on chin. **MURPHY'S PETREL**
- 20 Underwings and breast (but not necessarily the belly) white. 21
- 21 Light gray above, except for blackish carpal bar; white below, except for charcoal gray belly (which pales considerably with wear) and a broad dark bar running from wrist to armpit on underside of wing. **MOTTLED PETREL**
- 21 Entirely white below, including underwing (dark forward margin). **COOK'S PETREL** (see Species Accounts, Page 129)

KEY TO BOOBIES

- 1 Belly entirely white or very light gray (almost white). 2
- 1 Belly not white but rather mottled or dark. 8
- 2 Breast very dark brown; demarcation between breast and belly straight and abrupt. 3
- 2 Breast white or light brown; if brown, coloration grading gradually into belly or boundary not straight. 4
- 3 Forehead white or lighter than crown; feet green. **BROWN BOOBY, adult male**
- 3 Forehead and crown same dark color; feet more yellow. **BROWN BOOBY, adult female**
- 4 Throat entirely white. 5
- 4 Throat with some brown. 6
- 5 Tarsus 34-43 mm; bill length 77-90 mm; bill depth 28-34 mm; feet and legs red or, in young birds, pinkish. **RED-FOOTED BOOBY**

KEY TO BOOBIES (Continued)

- 5' Tarsus 53-62 mm; bill 98-106 mm; bill depth 35-38 mm; feet and legs blue-gray. MASKED BOOBY, adult
- 6 Feathers on head and neck light centrally with outer parts dark giving these areas a streaked appearance; feet light blue. BLUE-FOOTED BOOBY
- 6' Head and neck not streaked. 7
- 7 Head and neck dark brown, sometimes speckled; measurements as in 5'; feet light blue, occasionally tending toward pinkish. MASKED BOOBY, immature
- 7' Non-white color of neck, head or shoulders very light; measurements and foot color as in 5. RED-FOOTED BOOBY
- 8 Belly mottled dark and white; dark breast clearly defined in contrast to mottled belly; demarcation line straight between breast and belly. BROWN BOOBY, immature
- 8' Belly all one color or dark with light feather tips giving delicate scaled effect. 9
- 9 Dark belly feathers with fine, light edgings; feet green to yellow; bill length 90-101 mm; tarsus 41-51 mm. BROWN BOOBY, immature
- 9' Feathers without light edges; feet reddish; bill 77-90 mm; tarsus 34-43 mm. RED-FOOTED BOOBY

KEY TO CORMORANTS

- 1 General body coloration very dark with green or purple iridescence. 2
- 1' Body all brown or mostly brown; brown of belly and neck may be a very light sandy color or almost white. 5
- 2 Lower mandible yellow, culmen black. 3
- 2' Bill dark brown all over. 4

KEY TO CORMORANTS (Continued)

- 3 Bill short and deep (length at base only 2.7-3.4 times greater than depth) with very prominent and sharp hook, curving far below tip of lower mandible (Plate 9-1); throat skin yellow or orange; back feathers bronze with black edges giving a scaly appearance; long white or black plumes may or may not extend up and back from above each eye; dorsal wing coverts blunt (compared with 4 or 7).

DOUBLE-CRESTED CORMORANT, adult

- 3 Bill thinner (length at base 3.7-4.1 times greater than depth), hook barely reaching below lower mandible (Plate 9-4); face and throat skin red; back feathers dark iridescent green, not scaly; flank feathers may or may not be white; two crests on head, one extending back from forehead and the other projecting from back of head.

RED-FACED CORMORANT, adult

- 4 Bill length 64-80 mm; tarsus 59-72 mm; bill at base 3.8-4.3 times longer than deep at base (Plate 9-3); feathers of chin tan; throat pouch may be blue; long, thin white plumes may extend backward from sides of head and back; dorsal wing coverts pointed (compared with 3 or 6).

BRANDT'S CORMORANT, adult

- 4 Bill 42-57 mm; tarsus 47-59 mm; bill very thin, 4.4-6.0 times longer than deep at base (Plate 9-5); feathers of chin same color as head and throat; unfeathered portion of face and gular pouch red; flanks may or may not be white (depending on season).

PELAGIC CORMORANT, adult

- 5 Lower mandible entirely chrome yellow or yellow only at base.

6

- 5 Upper and lower mandible brown.

7

- 6 Unfeathered portion of face and gular pouch, as well as, lower mandible yellow; feathers of back tan with thick, dark brown edges giving a scaly appearance; belly and foreneck sometimes very light, almost white; bill as in 3 above (Plate 10-1).

DOUBLE-CRESTED CORMORANT, immature

- 6 Face and throat not yellow; back feathers brown with purple iridescence, not prominently scaly; bill as in 3.

RED-FACED CORMORANT, immature

- 7 Measurements as in 4.

BRANDT'S CORMORANT, immature

- 7 Measurements as in 4.

PELAGIC CORMORANT, immature

KEY TO WATERFOWL

- 1 Body, head and neck white or *very* light gray; wings white or white with black primaries; three or four outermost primaries with one or both webs cut out (Fig. 9). 2
- 1 Coloration largely brown or gray with a little white here or there; no primaries or only outer two decidedly and the third outermost sometimes slightly cut out (Fig. 9). 5
- 2 Wings entirely white or very light gray; primaries 10-7 have one or both webs cut out; area between eye and bill (the lores) not feathered; very large bird, wing chord 500-680 mm. 3
- 2 Wings largely white except for black primaries; primaries 10-8 have one or both webs cut out; medium large bird, wing chord 318-408 mm. 4
- 3 Tail of 20 feathers; usually, but not always, a yellow spot in front of eye; distance from tip of bill to anterior edge of nostril < 48 mm; wing chord 500-575 mm.
TUNDRA SWAN, adult (all white) or immature (gray wash to some feathers)
- 3 Tail of 24 feathers; never a yellow spot in front of eye; distance from tip of bill to anterior edge of nostril > 50 mm; wing chord 544-680 mm.
TRUMPETER SWAN, adult (all white) or immature (gray wash to some feathers)
- 4 Bill length 50-63 mm; sides of bill open in a black "grin" as in Plate 12a-2, where "grin" is > 1/3 the bill depth; wing chord 380-470 mm. SNOW GOOSE
- 4 Bill 34-46 mm; not as open on sides, "grin" < 1/3 the bill depth; wing chord 360-400 mm. ROSS' GOOSE
- 5 Tarsus with scutellate scales along edge (Fig. 13); no primaries cut out OR just primary 10 cut out on inner web OR primary 10 cut out on inner web and 9 cut on outer web OR primaries 9 and 10 cut out on outer webs (DUCKS). 10
- 5 Tarsus with reticulate scales along front edge; three outer primaries cut out: 10 on inner web, 9 on both webs and 8 (sometimes only slightly) on outer web (GEESE). 6
- 6 Head and neck black with white cheeks or a white collar (Fig. 12); feet and legs black. 7
- 6 Head and neck not black (except perhaps throat); feet not black. 8

KEY TO WATERFOWL (Continued)

- 7 Black of neck ends abruptly at tan breast; white cheeks; upper and undertail coverts not nearly as long as tail. CANADA GOOSE
- 7' Black of neck extends to back and breast; barred white collar (Fig. 12d); dark cheeks; upper and lower tail coverts usually as long as or longer than tail. BRANT
- 8 Head and neck entirely white (may be stained rusty); rump color variable, from pure white to light gray; feet purple, pinkish or in fall tending toward orange. SNOW GOOSE, blue phase
- 8' Head and neck with dark (and white) coloration; rump light to dark brown; feet yellow or pale. 9
- 9 Tail entirely white; back, scapulars, chest and sides silver-gray, feathers becoming black subterminally with white tips; orange legs and feet. EMPEROR GOOSE
- 9' Tail dark but with white tip; back and scapulars gray brown, feathers with paler tips; bluish dorsal wing coverts contrast otherwise brown plumage. GREATER WHITE-FRONTED GOOSE
- 10 Hind toe lobed (Plate 36-3). 11
- 10' Hind toe not lobed (similar to Plate 35-3). 46
- 11 Wings without distinctive color pattern (secondaries may be chestnut in male Oldsquaw, choice 14). 12
- 11' Secondaries with distinctive pattern, either brightly or plainly colored (white, black, gray) or tipped with white OR large white patch in shoulder. 18
- 12 Wing chord 200-254 mm; tail feathers not modified as in 12'; feet orange, blackish or gray. 13
- 12' Wing chord 138-155 mm; tail feathers narrow, stiff and pointed; feet grayish-blue (sometimes dark gray in juveniles). RUDDY DUCK
- 13 Belly and sides white; may or may not be white on wings; primary 10 cut out on inner web, 9 on outer web; scapulars much longer than secondaries and pointed; bill stubby, length 25-30 mm; tarsus 31-37 mm; feet gray. 14

KEY TO WATERFOWL (Continued)

- 13' No white except on head; primary 9 not cut out; scapulars not notably longer than secondaries, nor notably pointed; bill 36-47 mm; tarsus 40-49 mm; feet orange, red-orange or olive with black webs. 15
- 14 Breast black; upper mandible with pink saddle. OLDSQUAW, male
- 14' Breast brown anteriorly, but white near belly (which is also white); upper mandible with gray saddle. OLDSQUAW, female
- 15 Feathers of forehead extend forward on top of bill; feet red or orange or orange-brown with black webs; in folded wing, primary 10 equal in length to or longer than 9. 16
- 15' Feathers of forehead end abruptly and evenly at base of bill; feet black or dark greenish-brown with black webs; primary 10 shorter than 9 and 8 and sometimes shorter than 7. 17
- 16 Largely black all over except for white feathers on back of the head and nape; bill brightly colored. SURF SCOTER, adult male
- 16' Largely brown; black cap with spots on face; bill dull in color. SURF SCOTER, adult female and juvenile
- 17 Largely black; base of bill orange; primary 10 distinctive: very thin and cut out almost half its length on inner web and shorter than primary 7. BLACK SCOTER, male
- 17' Largely brown; two white spots on cheeks; primary 10 shorter than 8 and only indistinctly cut out if at all. SURF SCOTER, adult female and juvenile
- 18 Secondaries with blue coloration, sometimes very dull. 19
- 18' Secondaries not brightly colored - plainly colored or tipped with white OR not colored but wing with *distinctive* large white shoulder patch and elongated sickle-shaped tertials. 22
- 19 Secondaries blue, tipped with white; tertials elongated (longer than other secondaries) and curved outward from body. 20
- 19' Secondaries entirely blue (color may be very dull); tertials not noticeably longer than secondaries and not curved outward. 21

KEY TO WATERFOWL (Continued)

- 20 All wing coverts white; speculum as in Mallard (see choice 53).
STELLER'S EIDER, male
- 20 All wing coverts brown; speculum as in 20. STELLER'S EIDER, female
- 21 All wing coverts blue-gray; tertials white. HARLEQUIN DUCK, male
- 21 Wing coverts brown; secondaries only washed with blue.
HARLEQUIN DUCK, female
- 22 Secondaries not distinctively colored but secondary coverts white. 23
- 22 Secondaries distinctively colored. 24
- 23 Tertials dark. KING EIDER, male
- 23 Tertials light. SPECTACLED EIDER, male
- 24 Secondaries pearl gray, compared to brownish primaries. 25
- 24 Secondaries largely black, white or brown tipped with white. 28
- 25 Forehead sloping; bill elongated, as long as head, and slim (Plate 14b-2). 26
- 25 Forehead abrupt; bill short, broad (half as wide as long) (Plate 14b-3). 27
- 26 Head and neck red-chestnut; breast black. CANVASBACK, male
- 26 Head, neck and breast pale brown. CANVASBACK, female
- 27 Head and neck red-chestnut; breast black. REDHEAD, male
- 27 Head, neck and breast brown. REDHEAD, female
- 28 Speculum dark or mostly dark. 29
- 28 Speculum with much white. 32
- 29 Greater coverts and outer secondaries black, inner secondaries and tertials white.
COMMON EIDER, male

KEY TO WATERFOWL (Continued)

- 29' Secondaries and greater secondary coverts brown, tipped with white. 30
- 30 Tertials tipped with white. SPECTACLED EIDER, female
- 30' Tertials all one color. 31
- 31 Only inner secondaries and inner greater secondary coverts tipped with white. KING EIDER, female
- 31' All secondaries and secondary coverts tipped with white. COMMON EIDER, female
- 32 Secondaries white tipped with dark (SCAUP). 33
- 32' Secondaries white not tipped with dark (but some secondaries may be entirely dark). 36
- 33 Some white on outer web of the 5 inner primaries; wing chord > 220 mm. 34
- 33' No white on outer web of the 5 inner primaries; wing chord < 208 mm (birds not fitting 33 or 33' should be compared with specimens for identification). 35
- 34 Head gloss mostly greenish. GREATER SCAUP, male
- 34' Head brown but forehead and front of face may be white. GREATER SCAUP, female and immature
- 35 Head gloss mostly purple. LESSER SCAUP, male
- 35' As in 34'. LESSER SCAUP, female and immature
- 36 Inner secondaries and inner greater secondary coverts white; outer secondaries and outer greater secondary coverts green; bill long and slender with serrate edges (Plate 19-1) (MERGANSER). 37
- 36' Wing pattern not as above; bill more duck-like (broad and flat). 40
- 37 Nostril near middle of bill; feathering on bill near gape (corner of mouth) extends forward as far as that on lower mandible (Plate 19-1); in dorsal view, forehead feathering extends farther on bill toward bill tip than does feathering on side of upper mandible; wing chord 246-285 mm. 38

KEY TO WATERFOWL (Continued)

- 37' Nostril near base of bill; feathering on side of upper mandible near gape extends forward of that on lower mandible (Plate 19-2); feathering of forehead and on sides of upper mandible extends an equal distance toward bill tip; wing chord 213-257 mm. 39
COMMON MERGANSER, male
- 38 Head, neck and back green; breast belly and sides white to faintly salmon. 40
COMMON MERGANSER, female and immature
- 38' Head and neck chestnut; distinct demarcation between neck color and whitish of throat and breast. 41
COMMON MERGANSER, female and immature
- 39 Head green, throat largely white; sides grayish. 42
RED-BREASTED MERGANSER, male
- 39' As in 37' but neck color grading gradually into whitish throat and breast. 43
RED-BREASTED MERGANSER, female and immature
- 40 Wing chord >255 mm; wing entirely dark except for white of inner and middle secondaries and coverts. 44
- 40' Wing chord <246 mm. 45
- 41 Body black dorsally; reddish-orange bill; feet orange with black webs; greater secondary coverts tipped with white. 46
WHITE-WINGED SCOTER, male
- 41' Body brown dorsally; feet brown with black webs; greater secondary coverts entirely dark. 47
WHITE-WINGED SCOTER, female and immature
- 42 Feet yellow with dark webs. 48
- 42' Feet pink or gray 49
- 43 Breast entirely white. 50
- 43' Breast white with gray collar. 51
BARROW'S and COMMON GOLDENEYE, female and immature
- 44 Greater coverts black, center ones tipped with white; crescent-shaped white patch between eye and bill. 52
BARROW'S GOLDENEYE, male
- 44' Greater coverts white (though black at bases); round white spot between eye and bill. 53
COMMON GOLDENEYE, male

KEY TO WATERFOWL (Continued)

- 45 Feet pink; triangular white patch on crown of head extending to cheeks; all coverts mainly white. BUFFLEHEAD, male
- 45 Feet gray; head dark except for large white spot behind eye; wing coverts dark. BUFFLEHEAD, female and immature
- 46 Speculum black and white, some greater coverts chestnut. 47
- 46 Speculum containing bright metallic color: blue, green or blue-green. 48
- 47 Chestnut on coverts extensive, forming large patch on wing; undertail coverts lack chestnut color, rump gray. GADWALL, male
- 47 Chestnut on coverts very faint; rump brown. GADWALL, female
- 48 Upperwing coverts light blue forming a large blue wing patch. 49
- 48 Upperwing coverts not blue. 53
- 49 Wing chord >215 mm; bill spoon-shaped, widest at tip and >56 mm long; feet red-orange. 50
- 49 Wing chord <200 mm; bill not spoon-shaped, <50 mm long; feet yellow. 51
- 50 Rump, head and neck green; belly and sides cinnamon; breast white; bill very spatulate. NORTHERN SHOVELER, male
- 50 Generally brown all over; bill very spatulate. NORTHERN SHOVELER, female
- 51 Generally brown all over, except in wings. BLUE-WINGED and CINNAMON TEAL, female (see Species Accounts, Page 139)
- 51 Cinnamon of belly either very pale or a very dark, rich color. 52
- 52 Belly pale cinnamon (to buffy) with dark spots; head gray, with large white crescent in front of eye. BLUE-WINGED TEAL, male (see Species Accounts, Page 139)
- 52 Rich cinnamon red over much of body and head; bill more spatulate than in 52. CINNAMON TEAL, male
- 53 Speculum purplish-blue with upper and lower white border; feet orange. 54

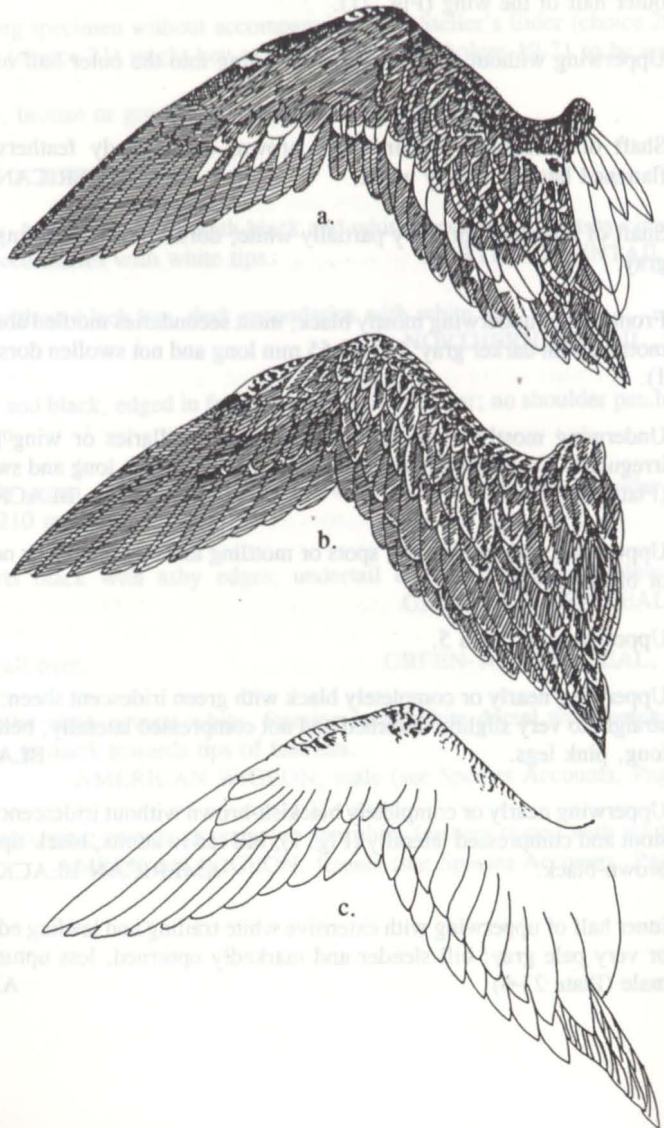
KEY TO WATERFOWL (Continued)

- 53' Speculum with no purple; feet bluish gray. 55
- 54 Generally brown all over (except speculum and whitish belly). MALLARD, female
- 54' Sides and belly white; breast cinnamon; rump, head and neck green OR with flecks of these colors in the latter 3 areas. MALLARD, male
- NOTE: In a wing specimen without accompanying feet, Steller's Eider (choice 20) and Harlequin Duck (choice 21) might key out to here; check choices 19-21 to be sure.
- 55 Speculum violet, bronze or green; dark secondaries tipped white. 56
- 55' Speculum green or green and black. 57
- 56 Speculum glossy, bordered behind with black and white bars and in front by cinnamon-buff bar; dark secondaries with white tips. NORTHERN PINTAIL, male
- 56' Speculum dull without black bar, dark secondaries with white tip. NORTHERN PINTAIL, female
- 57 Speculum green and black, edged in front by cinnamon-buff bar; no shoulder patch; wing chord < 210 mm. 58
- 57' Speculum mostly green, edged in front by black; large white or gray shoulder patch; wing chord > 210 mm. 59
- 58 Uppertail coverts black with ashy edges; undertail coverts black and yellow; sides gray. GREEN-WINGED TEAL, male
- 58' Body brownish all over. GREEN-WINGED TEAL, female
- 59 Middle and greater wing coverts white, forming large white dorsal wing patch; green speculum shades to black towards tips of feathers. AMERICAN WIGEON, male (see Species Accounts, Page 140)
- 59' Middle and greater wing coverts gray; green speculum feathers tipped with white. AMERICAN WIGEON, female (see Species Accounts, Page 140)

KEY TO SHOREBIRDS

- 1 Wing chord > 200 mm. 2
- 1' Wing chord < 200 mm. 13
- 2 Upperwing with a distinct, single, longitudinal white stripe that extends well into the outer half of the wing (Fig. 21). 3
- 2' Upperwing without a white stripe extending into the outer half of the wing (Fig. 21). 5
- 3 Shaft of outermost primary dark brown; dorsal body feathers blackish-brown; bill flattened laterally; belly white. AMERICAN OYSTERCATCHER
- 3' Shaft of outermost primary partially white; dorsal body feathering mottled or uniformly gray. 4
- 4 Front half of underwing mostly black; most secondaries mottled above; tail brownish gray mottled with darker gray; bill 50-65 mm long and not swollen dorsally near tip (Plate 22-1). WILLET
- 4' Underwing mostly white and medium gray, axillaries or wing pits black; tail white, irregularly barred with blackish-brown; bill 25-35 mm long and swollen dorsally near tip (Plate 20-7). BLACK-BELLIED PLOVER
- 5 Upperwing without barring, spots or mottling and completely or nearly completely black or black-brown. 6
- 5' Upperwing not as in 5. 7
- 6 Upperwing nearly or completely black with green iridescent sheen; tail gray; bill slender, straight to very slightly upturned and not compressed laterally; belly white; exceptionally long, pink legs. BLACK-NECKED STILT
- 6' Upperwing nearly or completely blackish-brown without iridescence; tail dark brown; bill stout and compressed laterally (Fig. 7); bill red in adults, black-tipped in juveniles; belly brown-black. AMERICAN BLACK OYSTERCATCHER
- 7 Inner half of upperwing with extensive white trailing and leading edges; tail grayish-white or very pale gray; bill slender and markedly upturned, less upturned and longer in the male (Plate 23-6). AMERICAN AVOCET

Figure 21. Shorebird wings showing the (a) presence (Ruddy Turnstone) or (b) absence (Pectoral Sandpiper) of a wing stripe; (c) underside of a Dunlin wing showing wrist markings.



KEY TO SHOREBIRDS (Continued)

- 7 Inner half of upperwing without extensive white areas; tail with barring; ventral body feathering never uniform white or blackish. 8
- 8 Lighter portion of underwings pink, buff or cinnamon; tail brown and barred. 9
- 8 Lighter portion of underwings whitish; tail white to pale buff with dark brown barring. 12
- 9 Underwing more cinnamon or buff than dusky; bill curved downward or upward. 10
- 9 Underwing more dusky than pink or buff; bill curved downward and almost always < 100 mm long. 11
- 10 Underside of primaries cinnamon with a variable amount of gray speckling; lower half of bill pink; bill curved upward, shorter in the male (Plate 23-4).
MARBLED GODWIT
- 10 Underside of primaries cinnamon with dusky bars; bill curved downward, shorter in the male (Plate 23-1). LONG-BILLED CURLEW
- 11 Tail pale rufous or orange-brown, heavily barred with dusky brown; bill shorter in the male (Plate 23-2). BRISTLE-THIGHED CURLEW
- 11 Tail tan-olive or buffy-olive with heavy, dusky brown barring; bill shorter in the male. WHIMBREL
- 12 Wing chord > 215 mm; upper surface of primary shafts 9 and 10 white; rump and outer tail feathers white, barred with black; bill length > 70 mm (much longer in the female). BAR-TAILED GODWIT
- 12 Wing chord < 215 mm; upper surface of shaft of primary 9 much browner than that of primary 10; bill < 70 mm; long, yellow legs. GREATER YELLOWLEGS
- 13 Upperwing with distinct longitudinal white stripe (Fig. 21). 22
- 13 Upperwing without distinct longitudinal white stripe (Fig. 21). 14
- 14 Shaft of outermost primary light brown on upper surface, outer web of outermost primary whitish in contrast to much darker inner web; tail with much orangish coloration; bill length 50-80 mm. COMMON SNIPE

KEY TO SHOREBIRDS (Continued)

- 14' Shaft of outermost primary usually whitish over much of its length; outer web of outermost primary dark as is inner web; tail not extensively orange. 15
- 15 Inner half of upperwing with white or golden spots. 16
- 15' Inner half of upperwing not spotted. 18
- 16 Front half of underwings (underwing coverts) brownish-gray; upperwing often with yellow or golden spots; tail dusky, irregularly barred with grayish-white or gray and yellowish; bill swollen dorsally near tip (Plate 20-6).
AMERICAN or PACIFIC GOLDEN PLOVER (see Species Accounts, Page 144)
- 16' Front half of underwings white with gray and brown barring; much of tail whitish with dusky barring; bill not swollen dorsally near tip. 17
- 17 Wing chord > 175 mm ; bill length > 47 mm. GREATER YELLOWLEGS
- 17' Wing chord < 175 mm; bill < 47 mm. LESSER YELLOWLEGS
- 18 Wing chord 160-190 mm; gray or white-tipped gray feathers dominate front half of underwing; tail and rump uniformly slate-gray. WANDERING TATTLER
- 18' Wing chord < 160 mm; white feathering conspicuous in some areas on front half of underwing; tail and rump not as in 18. 19
- 19 Inner secondaries with conspicuous white, zig-zag bars; bill length > 50 mm; tail barred white and black. LONG-BILLED or SHORT-BILLED DOWITCHER
- 19' Wings and bill not as above. 20
- 20 Central tail feathers mouse gray; outer tail feathers irregularly barred on inner web; toes lobed, margined laterally with conspicuous membrane (Plate 37-6); breast never streaked, spotted or barred but occasionally washed with gray or brown.
WILSON'S PHALAROPE
- 20' Central tail feathers black; toes not lobed, without lateral membranes (Plate 37-3); breast with some spotting, streaking or barring at least on sides. 21
- 21 Outermost tail feather distinctly shorter than adjacent ones; shaft of outermost primary usually partially brown dorsally. SHARP-TAILED SANDPIPER

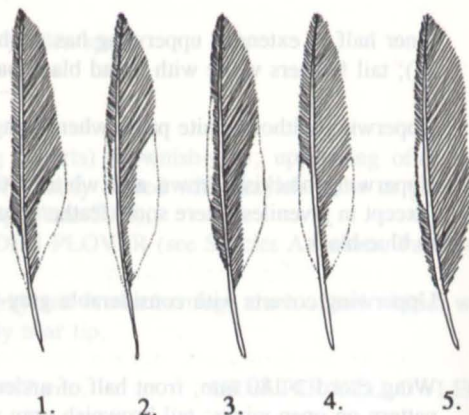
KEY TO SHOREBIRDS (Continued)

- 21' Outermost tail feather equal to or slightly longer than adjacent ones; shaft of outermost primary usually entirely white. **PECTORAL SANDPIPER**
- 22 Inner half of extended upperwing has a white patch where wing attaches to body (Fig. 21); tail feathers white with broad black band on outer half. **23**
- 22' Upperwing without white patch where wing attaches to body. **24**
- 23 Upperwing blackish brown and white without gray-brown, buff or rufous coloration (except in juveniles where some feathers may be finely buffy-tipped); throat gray-brown to blue-black. **BLACK TURNSTONE**
- 23' Upperwing coverts with considerable gray-brown, buff or rufous; throat mostly white. **RUDDY TURNSTONE**
- 24 Wing chord > 180 mm; front half of underwing mostly black; striking black and white pattern on open wings; tail brownish gray mottled with darker gray. **WILLET**
- 24' Wing not as in 24. **25**
- 25 Wing chord > 170 mm; underwing white and gray, axillaries (wing pits) black; tail white and irregularly barred with blackish-brown; bill 25-35 mm long and swollen dorsally near tip (Plate 20-7). **BLACK-BELLIED PLOVER**
- 25' Wing not as in 25. **26**
- 26 Wing chord < 115 mm; many upperwing coverts gray-brown with a dark bar near the tip; underwing shows distinct longitudinal white stripe; tail grayish-brown with lateral feathers broadly barred white; body white ventrally or white with heavy black spotting. **SPOTTED SANDPIPER**
- 26' Wing not as in 26. **27**
- 27 Wing chord > 140 mm, shaft of outermost primary markedly bicolored, white and dark brown on upper surface; bill shorter than head and swollen dorsally near tip (Plate 20-5); rump orange-brown; two dark breast bands in adult (one band in juvenile). **KILLDEER**
- 27' Wing not as in 27. **28**

KEY TO SHOREBIRDS (Continued)

Figure 22. Contrast patterns of shorebird feathers (natural size).

1. Red-necked Phalarope
2. Sanderling
3. Dunlin
4. Red Phalarope
5. Semipalmated Plover



- 28 White on upper surface of outer web of two or more of inner 6 primaries restricted to a patch adjacent to shaft and not extending to leading edge of feather (Fig. 22-5); wing chord 110-130 mm; bill swollen dorsally near tip, 9-15 mm long; one dark neck band; partial webbing between toes (Plate 37). SEMIPALMATED PLOVER
- 28 Wing does not fit both conditions in 28. 29
- 29 Underwings light and lacking conspicuous dark markings on leading edge; bill swollen dorsally near tip; hind toe lacking. 30
- 29 Underwings mostly dark or if light then with conspicuous dark marking on the leading edge (Fig. 21). 31
- 30 Wing chord 135-160 mm; bill length 18-24 mm; dark shoulder patch absent; tail whitish with central portion grayish-brown and darker toward tip. MOUNTAIN PLOVER
- 30 Wing chord 90-115 mm; bill 12-17 mm; shoulder patch present; outer portion of tail whitish with central portion grayish brown and darker toward tip. SNOWY PLOVER
- 31 White on upper surface of outer web of the 5th primary runs from the feather margin to shaft (Fig. 22-1, 2 and 4). 32
- 31 White on upper surface of outer web of the 5th primary does not reach shaft (Fig. 22-3) 35

KEY TO SHOREBIRDS (Continued)

- 32 Wing chord 160-190 mm; tail feathers white basally, black near tip. SURFBIRD
- 32' Wing chord < 160 mm. 33
- 33 Black on outer web of 5th primary meets shaft at obtuse angle (Fig. 22-2); toes partly webbed. SANDERLING
- 33' Black on outer web of 5th primary meets shaft at acute angle (Fig. 22-1, 4); toes lobed. 34
- 34 Wing chord 100-118 mm; bill tapering gradually toward sharp tip (Plate 21-3). RED-NECKED PHALAROPE
- 34' Wing chord 120-140 mm; bill swells noticeably laterally near tip before tapering to a point (Plate 21-2). RED PHALAROPE
- 35 Wing chord 145-180 mm; secondaries all dark; tail pale brownish-gray, not conspicuously darker centrally. RED KNOT
- 35' Wing chord < 145 mm. 36
- 36 Wing chord 109-144 mm. 37
- 36' Wing chord 80-108 mm. 42
- 37 Shafts of secondaries lack any brown coloration on upper surface; hind toe absent; bill swollen dorsally near tip (Plate 20-3); breast never spotted or streaked. WILSON'S PLOVER
- 37' Shafts of some secondaries have brown on upper surface, ranging from entirely brown to having merely a thin, longitudinal brown streak. 38
- 38 One to four of the inner secondaries predominantly (90% or more) white. 39
- 38' No secondaries predominantly white. 40
- 39 One or two inner secondaries predominantly white; bill black and decurved; legs black. DUNLIN

KEY TO SHOREBIRDS (Continued)

- 39' Three to four inner secondaries predominantly white; ridge on dorsal surface of upper mandible and base of lower mandible brownish; legs yellow or greenish.
ROCK SANDPIPER
- 40 No conspicuous white rump patch; back color giving scaly appearance, face and breast warm tan or buff.
BAIRD'S SANDPIPER
- 40' Conspicuous white rump patch (white rump feathers may have some dark brown markings). 41
- 41 Central tail feathers gray; bill noticeably curved downwards, >30 mm long (Plate 24-8).
CURLEW SANDPIPER
- 41' Central tail feathers brown-black; bill straight, <30 mm long.
WHITE-RUMPED SANDPIPER
- 42 Anterior toes with no trace of webbing (as in Plate 37-3). 43
- 42' Distinct partial web between outer and middle and inner and middle toes (somewhat like Plate 37-2). 44
- 43 Legs and feet yellowish; throat white, with or without brownish streaking; breast always with brownish streaking, although faint in worm plumage; bill width at nail <1.4 mm; wing chord 81-96 mm.
LEAST SANDPIPER
- 43' Legs and feet black; throat white and breast with gray of buffy-gray wash OR throat rufous and breast with dusky streaking or spotting; bill width at nail >1.4 mm; wing chord 93-108 mm.
RUFIOUS-NECKED STINT
- 44 Bill length usually <20 mm; bill length <10 times bill width at nail.
SEMIPALMATED SANDPIPER
- 44' Bill usually >20 mm; length >10 times bill width at nail.
WESTERN SANDPIPER

KEY TO SKUAS AND JAEGER

- 1 Large and stout birds; wing chord > 380 mm; tarsus shorter than middle toe with claw.
SKUA, probably SOUTH POLAR SKUA
- 1 Smaller and slightly built; wing chord < 375 mm; tarsus longer than middle toe. 2
- 2 Bill deeper than wide at base, 38-44 mm long; wing chord 349-374 mm; tarsus 48-55 mm; 5-8 white-shafted primaries. POMARINE JAEGER
- 2 Bill wider than deep at base, 27-35 mm long; wing chord 295-341 mm; tarsus 38-46 mm. 3
- 3 Humerus (wing bone from shoulder to elbow) 94-105 mm long; tarsi and feet almost always black (occasionally bluish in juveniles); bill saddle along culmen usually longer than chord of nail (Fig. 6); usually 3-5 white-shafted primaries. PARASITIC JAEGER
- 3 Humerus 83-88 mm; legs and basal half of toes and webs bluish, remainder of feet black; bill saddle along culmen usually shorter than chord of nail; two white-shafted primaries. LONG-TAILED JAEGER

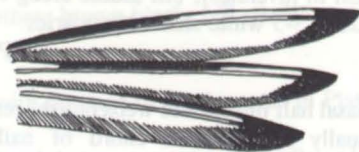
KEY TO GULLS

- 1 Outer 5 primaries wholly white. 23
- 1 Outer 5 primaries *not* wholly white. 2
- 2 Outer 5 primaries white with black tips; body plumage white with black spots. IVORY GULL, first year
- 2 Outer 5 primaries not white with black tips. 3
- 3 Wing chord < 325 mm. 4
- 3 Wing chord > 325 mm. 24
- 4 Wing chord > 295 mm. 5
- 4 Wing chord < 295 mm. 8

KEY TO GULLS (Continued)

- 5 Outer three primaries uniformly blackish (check inner webs carefully). 15
- 5' Outer three primaries with white or gray areas. 6
- 6 Outer three primaries extensively white, with black tips *and* dark (gray to black) trailing edges (Fig. 23). 17
- 6' Primaries not as above (KITTIWAKE). 7

Figure 23. Outer three primaries of the Common Black-headed Gull.



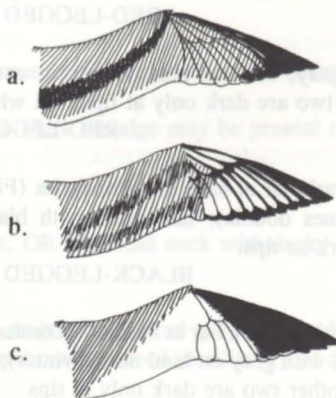
- 7 Mantle (Fig. 11) dark gray; culmen length 20 mm or less; tarsus and feet red, very brightly so in fresh specimens. 18
- 7' Mantle pale gray; culmen 31 mm or more; tarsus black or grayish. 19
- 8 Wing chord < 230 mm. 20
- 8' Wing chord > 230 mm. 9
- 9 Upperwing surface with three bold triangles of more or less solid color: outer primaries forming black triangle, inner primaries and secondaries forming white triangle, wing coverts and back forming gray or brown triangle (Fig. 24); tail slightly forked; bill black with yellow tip. 21
- 9' Upperwing surface not displaying triangles of solid color. 10
- 10 Wing mostly uniform gray above and below, except black leading edge to outer primary; central tail feathers longer than outer tail feathers; pink cast to underparts.

ROSS' GULL, adult

KEY TO GULLS (Continued)

- 10' Not as above. 11
- 11 Outer primaries with conspicuous white areas. 22
- 11' Outer primaries uniformly dark, or with very small white areas at tips; tail white with black band, which does *not* extend to two outermost tail feathers.
FRANKLIN'S GULL, first year
- 12 Wing chord > 275 mm; underside of wing grayish. 17
- 12' Wing chord < 275 mm. 13
- 13 Upperwing surface with brown or black bar at base of secondaries (Fig. 24). 14
- 13' Upperwing surface *without* brown or black bar at base of secondaries.
BONAPARTE'S GULL, adult

Figure 24. Color patterning in the extended wings of (a) immature Black-legged Kittiwake and (b) immature Bonaparte's Gull, and (c) immature Sabine's Gull.



- 14 Wing bar at base of secondaries black; tail distinctly wedge-shaped (central tail feathers longer than outer tail feathers).
ROSS' GULL, first year
- 14' Wing bar at base of secondaries brown; tail not as above.
BONAPARTE'S GULL, first year

KEY TO GULLS (Continued)

- 15 Tail white with black band (including outer feathers); top of head, neck and back uniformly brown; wings with brownish cast. LAUGHING GULL, first year
- 15 Tail white or nearly so; top of head, neck and back not uniformly brown. 16
- 16 Head white with dusky spotting on nape usually extending down neck; wings with brownish cast. LAUGHING GULL, second year
- 16 Head hooded with black (summer); OR white with dusky spotting on upper nape (winter); wings without brownish cast. LAUGHING GULL, adult
- 17 Upper surface of wing with brown bar at base of secondaries; tail white, banded with black; head with a dark spot behind eye. COMMON BLACK-HEADED GULL, first year
- 17 Upper surface of wing without brown bar at base of secondaries; tail white; head black (summer), OR white with dark spot behind eye (winter). COMMON BLACK-HEADED GULL, adult
- 18 Outer primary coverts with black; back of neck spotted with black; in outer three primaries, leading edge as dark as tips; tail all white in all age-classes. RED-LEGGED KITTIWAKE, first year
- 18 Outer primary coverts pure gray; back of neck white; in outer three primaries, only outermost as in 18, the other two are dark only at tips; tail white. RED-LEGGED KITTIWAKE, adult
- 19 Upper surface of wing with dark bar at base of secondaries (Fig. 24); hind neck (nape) with blackish collar (sometimes double); tail white with black band; in outer three primaries, leading edge as dark as tips. BLACK-LEGGED KITTIWAKE, first year
- 19 Upper surface of wing gray without dark bar at base of secondaries; tail pure white; head white (summer), OR smudged with gray on hind neck (winter); in outer three primaries, only outermost as in 19, the other two are dark only at tips. BLACK-LEGGED KITTIWAKE, adult
- 20 Upper surface of wing with bold black bar at base of secondaries; back feathers dull black with broad white edgings; tail white with black band. LITTLE GULL, first year

KEY TO GULLS (Continued)

- 20' Upper surface of wing and back uniform gray; underwing coverts dark gray; tail white; head black (summer); OR white with gray smudge on hind neck and black spot behind eye (winter). LITTLE GULL, adult
- 21 Top of head, back and adjacent wing surfaces brownish-gray; tail white, banded with black. SABINE'S GULL, first year
- 21' Back and adjacent wing surfaces uniform gray; head black (summer), OR white with black spot behind eye (winter); tail white. SABINE'S GULL, adult
- 22 Secondaries and tertials gray with conspicuous white tips. FRANKLIN'S GULL, adult
- 22' Secondaries and tertials not gray with conspicuous white tips. 12
- NOTE: Albino gulls of many species may key out to this step. Identification of albino gulls usually requires comparison with known material by someone very knowledgeable about gulls. Interesting specimens should be saved. Pure white birds or birds with excessively worn and bleached feathers should be identified with caution.
- 23 Wing chord <360 mm; plumage all white; legs black; bill black with yellow tip. IVORY GULL, adult
- 23' Wing chord >425 mm; plumage usually with some buffy or gray. 61
- 24 Tail nearly all white (dark smudge may be present on a few tail feathers). 25
- 24' Tail not all white. 34
- 25 Head entirely white; OR head and neck with dusky *streaks*; wing length usually >330 mm. 26
- 25' Head black, brown or gray; OR head white with a blackish smudging on top extending down back of the neck; wing chord usually <330 mm. 15
- 26 Wing tips without black. GLAUCOUS-WINGED GULL, adult

NOTE: Glaucous-winged Gulls interbreed with Western and Herring gulls. The progeny often have very dark wing tips and may be confused with Western, Herring or Thayer's Gulls. Beach walkers in northern California, Oregon, Washington and British Columbia should be cautious of this problem.

KEY TO GULLS (Continued)

- 26' Wing tips with black (sometimes dark gray). 27
- 27 Outer three primaries not distinctly darker than inner primaries and secondaries; mantle dark, slate gray. 28
- 27' Outer three primaries distinctly darker than inner primaries and secondaries; mantle pearly to silver-gray. 30
- 28 Wing chord > 420 mm; two white spots (windows, see Fig. 16) or much terminal white in outer primaries; Bering Sea and Aleutians. SLATY-BACKED GULL, adult
- 28' Wing chord < 420 mm; one white spot in outer primaries; Mexico to British Columbia. 29
- 29 Legs and feet bright yellow; Gulf of California and Salton Sea. YELLOW-FOOTED GULL, adult
- 29' Legs and feet pink; Pacific Coast of Baja California north to British Columbia. WESTERN GULL, adult
- NOTE: The last two forms are usually indistinguishable without the leg color.
- 30 Bill plain yellow-green, sometimes with dusky subterminal mottling or dusky tip; outermost two primaries with large white spots near the tips; culmen usually < 37 mm; eye dark. MEW GULL, adult
- 30' Lower mandible with red and/or black at gonydeal angle; culmen usually > 37 mm. 31
- 31 Bill banded (both mandibles) with black (as in Fig. 15), no red at gonydeal angle; gray of back and wings very pale; iris and legs yellow. RING-BILLED GULL, adult
- 31' Lower mandible with red spot at angle. 32
- 32 Bill almost always with both black and red splotches at gonys; eye dark brown; legs bluish to greenish; gray of back and wings relatively dark, like that of Western Gull. CALIFORNIA GULL, adult
- 32' Bill without black band; legs pink. 33

KEY TO GULLS (Continued)

- 33 Upper surface of wing tips dark gray to black, under surface light gray; eye brownish often with dark flecks. THAYER'S GULL, adult
- 33 Upper surface of wing tip black, under surface dark gray to black; eye yellow without flecks; very pale gray mantle, like Ring-billed Gull. HERRING GULL, adult
- 34 Underparts uniform dark gray or brown; no mottling. 59
- 34 Underparts mostly white, OR mottled with brown or gray. 35
- 35 Tail with distinct dark subterminal band (Fig. 15). 36
- 35 Tail not distinctly banded (usually with areas of dark and light mottling). 39
- 36 Band along wing at base of secondaries (greater secondary coverts) gray; culmen usually >37 mm. 37
- 36 Band along wing at base of secondaries (greater secondary coverts) brownish; culmen usually <37 mm. 38
- 37 Upperwing (lesser and middle) coverts brownish, tipped with white; tips of primaries pointed. RING-BILLED GULL, first year
- 37 Upperwing (lesser and middle) coverts gray; tips of primaries rounded. RING-BILLED GULL, second year
- 38 Secondaries browner than mantle; primaries more or less pointed. MEW GULL, first year
- 38 Secondaries gray like mantle; primaries more or less rounded. MEW GULL, second year
- 39 Tail with gray or buffy, no dark brown. 40
- 39 Tail with dark brown or black, sometimes largely white or largely brown. 45
- 40 Back between wings brown or gray-brown, much mottling; underparts clouded and flecked with gray-brown; bill black. 41
- 40 Back between wings primarily gray; underparts more or less white; tail with much white basally; bill with some paleness below. 42

KEY TO GULLS (Continued)

- 41 Bill rather large and heavy, gonys prominent (Plate 26a-4); primaries gray on both upper and under surfaces. GLAUCOUS-WINGED GULL, first year
- 41 Bill more slender, gonys slight (Plate 26b-2); primaries usually dark gray-brown on upper surface and whitish on under surface with distinct paler borders at the tips. THAYER'S GULL, first year
- 42 Back between wings gray; wing coverts brown; bill pale at base but dark towards tip, lacking red or orange at gonydeal angle. 43
- 42 Back between wings and wing coverts mostly gray; bill yellowish, usually with a trace of orange at angle and dusky towards tip; underparts nearly all white. 44
- 43 Bill rather large and heavy (Plate 26a-4); primaries gray on both upper and under surfaces. GLAUCOUS-WINGED GULL, second year
- 43 Bill more slender (less pronounced gonydeal angle; Plate 26b-2); primaries usually dark gray-brown to black on upper surface with distinct paler borders, pale gray on under surface. THAYER'S GULL, second year
- 44 Bill rather large and heavy (Plate 26a-4); primaries gray on both upper and under surfaces. GLAUCOUS-WINGED GULL, third year
- 44 Bill more slender (less pronounced gonydeal angle; Plate 26b-2); primaries usually dark gray-brown to black on upper surface, white on under surface. THAYER'S GULL, third year
- 45 Back between wings light to dark brown, mottled. 46
- 45 Back between wings light to dark gray, not mottled. 51
- 46 Bill all black (maybe some pale areas basally in late spring). 47
- 46 Bill with pale area basally. 50
- 47 Body plumage very dark brown; outer primaries not distinctly darker than inner primaries and secondaries; tail nearly solid dark brown; bill large with a prominent gonydeal angle. 48
- 47 Plumage generally paler; outer primaries distinctly darker than inner primaries and secondaries. 49

KEY TO GULLS (Continued)

- 48 Wing chord >410 mm; body barred or finely speckled, the dusky areas usually exceeding the white; unusual north of British Columbia.
WESTERN GULL, first year
- 48' Wing chord <410 mm; body coarsely spotted, the white areas usually exceeding the dark; not to be expected outside of the Bering Sea and Aleutian area in the eastern Pacific Ocean.
SLATY-BACKED GULL, first year
- 49 Bill rather slender (less pronounced gonydeal angle; Plate 26b-2); primaries dark brown to black on upper surface, usually with distinct pale edgings, pale gray to brown on under surface.
THAYER'S GULL, first year
- 49' Bill large with prominent gonydeal angle; bill is like that of Western Gull but gender for gender larger; primaries very dark brown on both upper and under surfaces; belly white.
YELLOW-FOOTED GULL, first year
- 50 Bill pink in basal half with clearly defined blackish tip.
CALIFORNIA GULL, first year
- 50' Bill black or with pink base grading into blackish tip.
HERRING GULL, first year
- 51 Back between wings gray; wing coverts and secondaries brown; tail usually largely dark brown. 52
- 51' Back between wings, wing coverts and secondaries more or less uniform gray, sometimes with a brownish cast; tail usually with some white at the base and at very tip of the feathers. 55
- 52 Back between wings dark gray; outer three primaries *not* distinctly darker than inner primaries and secondaries. WESTERN GULL, second year
- 52' Back between wings light gray; outer three primaries distinctly darker than inner primaries. 53
- 53 Legs dull bluish; eye dark brown; primaries very dark brown without conspicuous edgings. CALIFORNIA GULL, second year
- 53' Legs pink; eye pale brown or yellow. 54
- 54 Primaries black on both upper and undersides, without conspicuous pale edgings; eye pale yellow.
HERRING GULL, second year

KEY TO GULLS (Continued)

- 54 Primaries light brown with conspicuous pale edgings; underside of primaries pale brown; eye brown. THAYER'S GULL, second year
- 55 Tail nearly all dark; feet yellowish. YELLOW-FOOTED GULL, second year
- 55 Tail mostly white, with dark spots on all or some tail feathers. 56
- 56 Outer three primaries not distinctly darker than inner primaries and secondaries; bill with prominent gonydeal angle (Plate 26a-2). WESTERN GULL, third year
- 56 Outer three primaries distinctly darker than inner primaries and secondaries; gonydeal angle not as prominent (Plate 26b). 57
- 57 Legs bluish-gray to greenish; iris dark brown. CALIFORNIA GULL, third year
- 57 Legs bright pink; iris yellow or brownish. 58
- 58 Iris clear yellow; under surface of primary tips black. HERRING GULL, third year
- 58 Iris brown, often flecked with dark brown; under surface of primary tips pale gray. THAYER'S GULL, third year
- 59 Bill red with black tip; mantle and adjacent wing surface dark, slate-gray; tail black, tipped with white; legs and feet black. HEERMANN'S GULL, adult
- 59 Bill pale pink at base with black tip; mantle and adjacent wing surfaces dark gray washed with brown; OR these areas dark brown; tail dark blackish-brown, lacking white tip; legs and feet black. 60
- 60 Mantle is pure dark gray; adjacent wing surfaces with some dark brown; head and underparts medium gray. HEERMANN'S GULL, second year
- 60 Plumage wholly dark chocolate brown, somewhat paler on upperwing surface. HEERMANN'S GULL, first year
- 61 Plumage marbled with pinkish-buff feather edgings, primaries contrastingly white; bill pink basally, with clearly defined black tip; primaries more or less pointed; tail feathers rounded at tips. GLAUCOUS GULL, first year
- 61 Plumage paler, nearly all white, sometimes with pale gray on back; primaries more rounded; tail feathers more squarish at tips. 62

KEY TO GULLS (Continued)

- 62 Pale gray feathers present on back. 63
- 62' No pale gray on back, some individuals may approach pure white; bill color as in 61.
GLAUCOUS GULL, second year
- 63 Tail pure white; bill yellow with red spot at gonydeal angle.
GLAUCOUS GULL, adult
- 63' Tail often freckled with dusky or smudged terminally; bill usually with a dusky band near tip.
GLAUCOUS GULL, third year

KEY TO TERNS AND SKIMMERS

- 1 Basic color of upper surface of wings, back and hind neck dark brown, black or dark charcoal-gray (tips of secondaries may be white) close in color to back of head, but sometimes with buffy feather edgings. 2
- 1' Basic color of upperwings, back and hind neck light gray, or pearly to silver-gray; sometimes neck almost white, otherwise much lighter than cap or back of head; sometimes with buffy feather edgings. 7
- 2 Wing chord < 225 mm; webbing extending only half way to end of toes (Plate 37-2). 3
- 2' Wing chord > 270 mm; toes fully webbed. 4
- 3 Brown edgings on wing coverts; belly white. BLACK TERN, immature
- 3' Wing coverts entirely charcoal-gray; belly black or white. BLACK TERN, adult
- 4 Wing chord 270-300 mm; upper surface of wing entirely black or dark brown except that coverts may have buffy tips; tarsus 20-25 mm. 5
- 4' Wing chord 338-412 mm; secondaries broadly tipped with white; tarsus 28-37 mm; bill-shape unique among all birds (Plate 29-4). 6
- 5 Upper surface of wings entirely jet black; belly white.
SOOTY TERN, adult (see Species Accounts, Page 156)

KEY TO TERNS AND SKIMMERS (Continued)

- 5' Wing coverts with buffy tips; belly charcoal-gray. SOOTY TERN, immature
- 6 Upperwing jet black except for white in secondaries (sometimes on inner primaries). BLACK SKIMMER, adult
- 6' Upperwing coverts with light tips, otherwise upperwing dark brown. BLACK SKIMMER, immature
- 7 Wing chord > 295 mm; tarsus > 27 mm. 8
- 7' Wing chord < 290 mm; tarsus < 24 mm. 15
- 8 Both webs of outer 4 primaries black; wing chord 400-423 mm; tarsus 40-46 mm; bill tomato-red with dusky tip. 9
- 8' Outer web of outer 4 primaries black, inner web white except for broad dark stripe next to shaft (Fig. 25a); wing chord < 395 mm; tarsus < 36 mm. 10
- 9 Wing coverts each with dark brown V, bordered by white. CASPIAN TERN, immature
- 9' Wing coverts pearly gray (primaries darker). CASPIAN TERN, adult
- 10 Wing chord 357-393 mm; bill entirely orange (no dusky tip). 11
- 10' Wing chord < 330 mm. 12
- 11 Some wing coverts with dark outer portions. ROYAL TERN, immature
- 11' Wing coverts pearly gray. ROYAL TERN, adult
- 12 Dark coloration in webbing of outer primaries very light, in primaries 7-9 white of inner web grading gradually to dark area near shaft (Fig. 25b); bill heavy in proportion. 13
- 12' Dark coloration in primary webbing very dark, forming a dark stripe near shaft very distinct from outer portion of inner web (Fig. 25a); bill long and sharp. 14
- 13 Brown or buffy edgings to feathers of back and wing coverts. GULL-BILLED TERN, immature
- 13' No buffy edgings on any feathers. GULL-BILLED TERN, adult

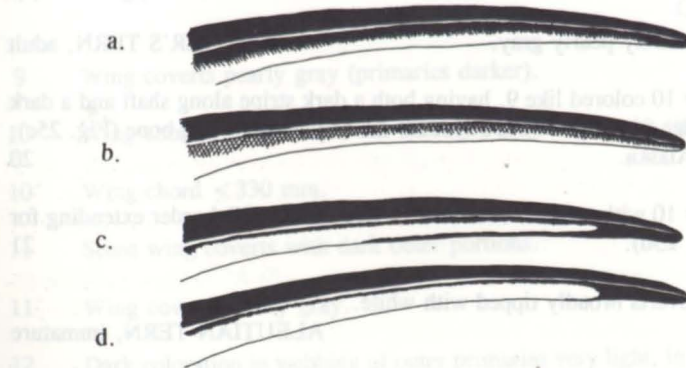
TERNs AND SKIMMERS (Continued)

- | | | | |
|----|--|--------------------------|----|
| 14 | Buffy edgings to feathers on back and wing coverts. | ELEGANT TERN, immature | |
| 14 | No buffy edgings on any feathers; bill entirely orange. | ELEGANT TERN, adult | |
| 15 | Very small; wing chord < 180 mm. | | 16 |
| 15 | Wing chord 230-290 mm. | | 17 |
| 16 | Tips of upperwing coverts buffy, each with a dark center within buffy area. | LEAST TERN, immature | |
| 16 | Coverts pearly gray. | LEAST TERN, adult | |
| 17 | Dark stripe along shaft on inner web (contrasting with white along outer edge) distinct only in primaries 10 and 9 (Fig. 24b); inner primaries largely dusky throughout. | | 18 |
| 17 | Dark stripe referred to in 17 very distinct on at least the outer 6 primaries. | | 19 |
| 18 | Upperwing coverts with buffy edges. | FORSTER'S TERN, immature | |
| 18 | Upperwing coverts entirely pearly gray. | FORSTER'S TERN, adult | |
| 19 | Inner web of primary 10 colored like 9, having both a dark stripe along shaft and a dark border along outer edge from tip inward about 1/3 the way toward wing bone (Fig. 25c); no records south of Alaska. | | 20 |
| 19 | Inner web of primary 10 without dark border referred to in 19; OR border extending for only a few mm (Fig. 25d). | | 21 |
| 20 | Greater upperwing coverts broadly tipped with white. | ALEUTIAN TERN, immature | |
| 20 | Greater wing coverts dark. | ALEUTIAN TERN, adult | |
| 21 | Viewed from above, outer (leading) web of primary 10 usually about as dark (almost black) as stripe along shaft on inner web (as in Fig. 25a), primary 10 completely dark along outer 20-33 mm of tip; tarsus 17-21 mm, longer than middle toe without claw. | | 22 |

KEY TO TERNS AND SKIMMERS (Continued)

- 21' Outer web of primary 10 usually decidedly darker than stripe on inner web (as in Fig. 25b); primary 10 dark along outer 15-25 mm; tarsus 13-16 mm, shorter than middle toe without claw. 23
- 22 Feathers of back and wing coverts with buffy tips. COMMON TERN, immature
- 22' No buffy edges on any feathers. COMMON TERN, adult
- 23 Feathers of back and wing coverts with buffy tips. ARCTIC TERN, immature
- 23' No buffy edges on any feathers. ARCTIC TERN, adult

Figure 25. Contrast patterns of outer primaries in terns.



KEY TO ALCIDS

- 1 Large: exposed culmen > 25 mm; wing chord > 162 mm; tarsus usually > 30 mm. 2
- 1' Small: exposed culmen < 25 mm; wing chord < 160 mm; tarsus usually < 30 mm. 17
- 2 Underwing linings mostly white. 3
- 2' Underwing linings mostly dark. 8
- 3 A great deal of white in wing coverts of upper surface of wing; secondaries dark; feet may be pink to intense red. 4
- 3' Upperwing dark except that secondaries are broadly tipped with white; feet black or brown (MURRE). 5
- 4 Scapulars and back feathers checkered with black and white; upperwing coverts mottled black and white. BLACK GUILLEMOT, immature
- 4' Scapulars and back black; upperwing coverts extensively white; underwings white. BLACK GUILLEMOT, adult
- 5 Throat and entire head dark. 6
- 5' Throat and lower cheeks white. 7
- 6 Side of bill near cutting edge at base white (giving appearance of a light mustache); depth of bill at gonydeal angle $> 1/3$ the exposed culmen; culmen evenly decurved; no dark barring on sides of body. THICK-BILLED MURRE, breeding plumage
- 6' Dark barring on sides of body; bill entirely dark; depth of bill at gonydeal angle $< 1/3$ the exposed culmen. COMMON MURRE, breeding plumage
- 7 White cheeks extending upward behind eye to cap, then posteriorly to back of head (where black cap extends down neck), a distinct dark line extending from eye back to intersect most of white on side of head (as in Fig. 26); dark barring on sides of body; bill as in 6'. COMMON MURRE, winter adult and first year
- 7' White of cheeks posterior to eye not extending above eye level, dark line back from eye region indistinct; dark barring on sides of body bill as in 6. THICK-BILLED MURRE, winter adult and first year

Figure 26. Murre chick old enough to accompany adult at sea; natural size (1/3 the size of an adult) for comparison with Figure 27.

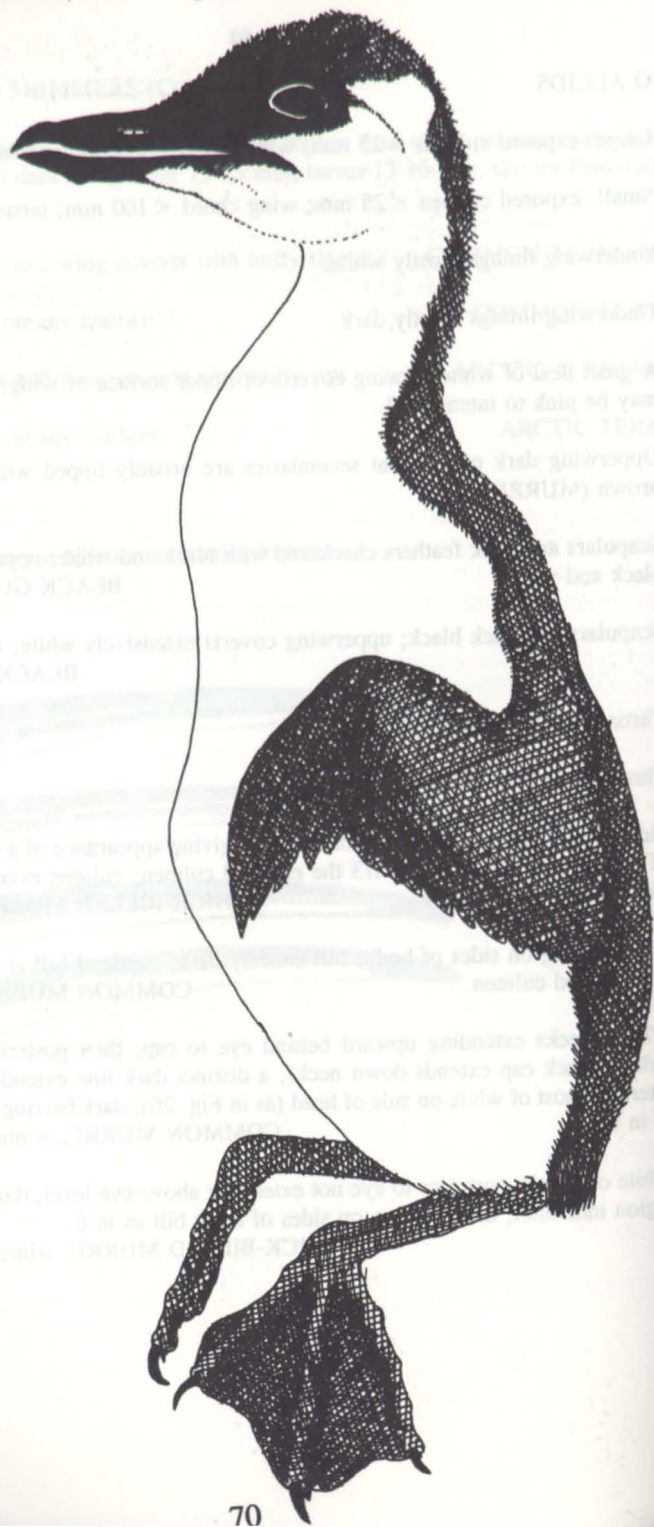
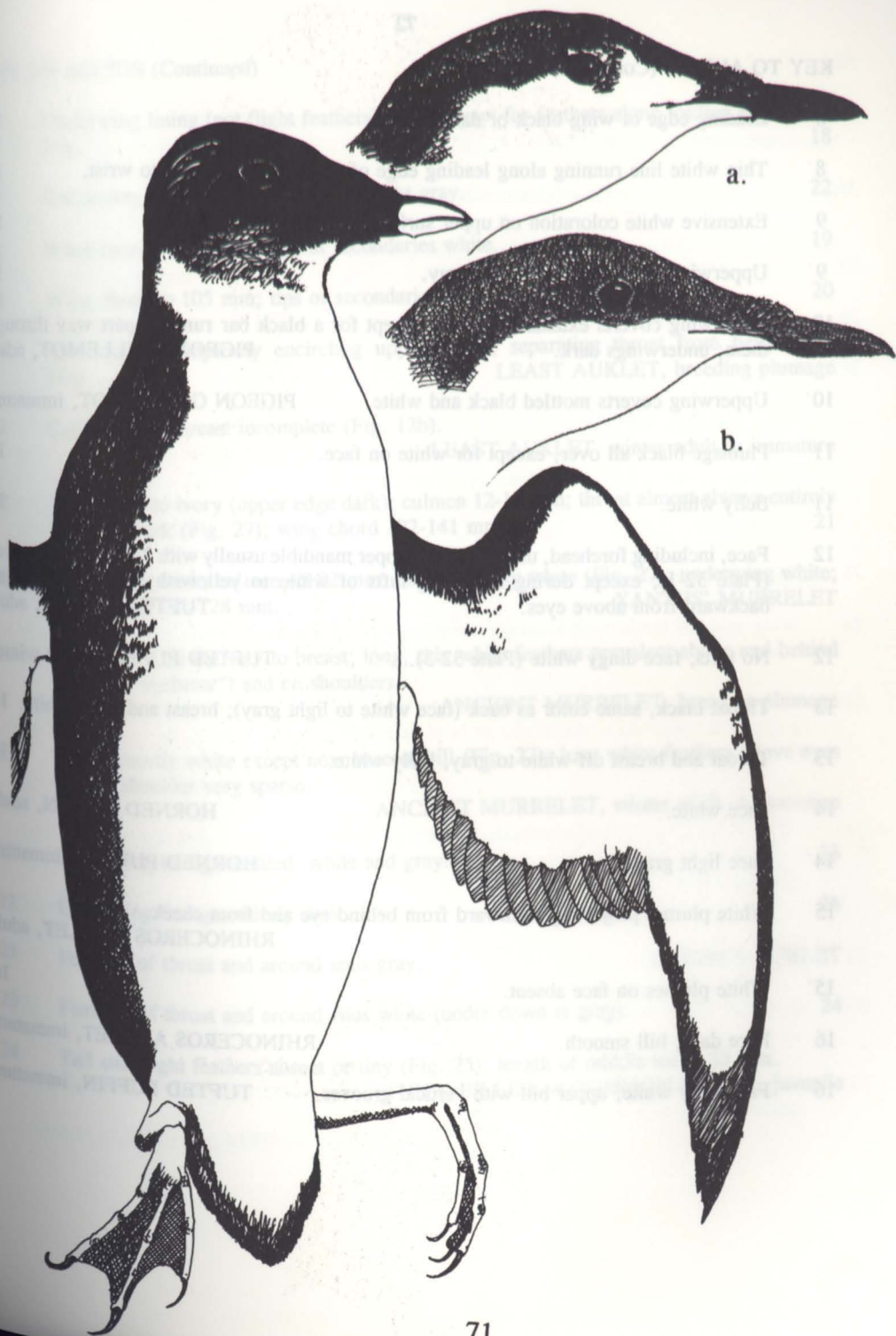


Figure 27. Ancient Murrelet and head of Xantus' Murrelet (a, *S. h. hypoleucus* and b, *S. h. scrippsi*; natural size, for comparison with Figure 26.



KEY TO ALCIDS (Continued)

- | | | |
|----|---|-----------------------------|
| 8 | Leading edge of wing black or dark brown. | 9 |
| 8 | Thin white line running along leading edge of wing from shoulder to wrist. | 11 |
| 9 | Extensive white coloration on upper surface of wing. | 10 |
| 9 | Upperwing surface entirely dark gray. | 14 |
| 10 | Upperwing coverts extensively white except for a black bar running part way through them; underwings dark. | PIGEON GUILLEMOT, adult |
| 10 | Upperwing coverts mottled black and white. | PIGEON GUILLEMOT, immature |
| 11 | Plumage black all over, except for white on face. | 12 |
| 11 | Belly white. | 13 |
| 12 | Face, including forehead, usually white; upper mandible usually with 2-3 vertical grooves (Plate 32-1); except during fall, long tufts of white to yellowish feathers extending backward from above eyes. | TUFTED PUFFIN, adult |
| 12 | No tufts; face dingy white (Plate 32-3). | TUFTED PUFFIN, adult winter |
| 13 | Throat black, same color as back (face white to light gray); breast and belly white. | 14 |
| 13 | Throat and breast off-white to gray; belly white. | 15 |
| 14 | Face white. | HORNED PUFFIN, adult |
| 14 | Face light gray | HORNED PUFFIN, immature |
| 15 | White plumes projecting backward from behind eye and from cheek. | RHINOCEROS AUKLET, adult |
| 15 | White plumes on face absent. | 16 |
| 16 | Face dark; bill smooth. | RHINOCEROS AUKLET, immature |
| 16 | Face dirty white; upper bill with vertical grooves. | TUFTED PUFFIN, immature |

KEY TO ALCIDS (Continued)

- 17 Underwing lining (not flight feathers) white except for feathers along leading edge (Fig. 27). 18
- 17' Underwing lining dark, mottled, or light gray. 22
- 18 Wing chord < 105 mm; tips of secondaries white. 19
- 18' Wing chord > 105 mm; tips of secondaries dark. 20
- 19 Dark collar completely encircling upper breast, separating throat from belly (Fig. 12a). LEAST AUKLET, breeding plumage
- 19' Collar around breast incomplete (Fig. 12b). LEAST AUKLET, winter adult or immature
- 20 Bill yellow to ivory (upper edge dark); culmen 12-16 mm; throat almost always entirely or partly dark (Fig. 27); wing chord 122-141 mm. 21
- 20' Bill entirely dark, culmen 15-22 mm; throat entirely white (Fig. 27); underwing white; wing chord 111-128 mm. XANTUS' MURRELET
- 21 Throat dark all the way to breast; long, thin white feathers prevalent above and behind eyes (an "eyebrow") and on shoulders. ANCIENT MURRELET, breeding plumage
- 21' Throat mostly white except near base of bill (Fig. 27); long white feathers above eyes and on shoulder very sparse. ANCIENT MURRELET, winter adult or immature
- 22 Underwing linings mottled, white and gray. 23
- 22' Underwing linings entirely dark. 25
- 23 Feathers of throat and around anus gray. CASSIN'S AUKLET
- 23' Feathers of throat and around anus white (under down is gray). 24
- 24 Tail and flight feathers absent or tiny (Fig. 25); length of middle toe > 32 mm. THICK-BILLED or COMMON MURRE, juvenile

KEY TO ALCIDS (Continued)

- 24' Tail and flight feathers present (as in Fig. 27); length of middle toe < 26 mm; underwings mostly dark. CRAVERI'S MURRELET
- 25 Wing chord < 90 mm; primaries absent or tiny (Fig. 26). THICK-BILLED or COMMON MURRE, juvenile
- 25' Wing chord > 95 mm; primaries present. 26
- 26 Wing chord 97-105 mm. 27
- 26' Wing chord > 115 mm. 28
- 27 Bill red with white tip; long curved feathers form crest on forehead; white facial plumes very prominent. WHISKERED AUKLET, adult
- 27' Bill yellowish at base, dark at tip; no crest; white facial plumes present but not prominent. WHISKERED AUKLET, immature
- 28 Secondaries and tail feathers broadly (2-3 mm wide) tipped with white. 29
- 28' Wing and tail feathers dark except some coverts on upper surface of wing may be very narrowly edged with white. 30
- 29 Belly and breast white except many feathers tipped with dark brown, giving undersurfaces a speckled appearance; remainder of head and body plumage brown, streaked white and buffy. KITTLITZ'S MURRELET, breeding plumage
- 29' Sides of head and all undersurfaces completely white except for a dark incomplete breast collar (Fig. 12b) and a very occasional feather with a dark tip; scapular and shoulder feathers white. KITTLITZ'S MURRELET, winter or immature
- 30 Scapulars cinnamon, OR white. 31
- 30' Scapulars gray, same color as remainder of wing. 32
- 31 Scapulars cinnamon; undersurfaces of body with white feathers tipped with brown giving spotted appearance; upper surfaces dark. MARBLED MURRELET, breeding plumage

KEY TO ALCIDS (Continued)

- 31 Scapulars white; undersurfaces of body largely white except for occasional dark tipped feathers; lower face white. MARBLED MURRELET, winter and immature
- 32 Bird entirely gray except often some elongated white feathers on face. 33
- 32 White on belly and breast; remainder of plumage gray except often some elongated white feathers on face. 34
- 33 No elongated, curved feathers on forehead forming a crest; no white plumes on face. CRESTED AUKLET, immature
- 33 Elongated feathers forming a crest on forehead; white plumes extending backward from face. CRESTED AUKLET, adult
- 34 Throat dark; bill red; elongated white plumes extending backward from behind eye. PARAKEET AUKLET, breeding plumage
- 34 Throat light; bill dull red; no elongated white plumes on face. PARAKEET AUKLET, winter adult and immature

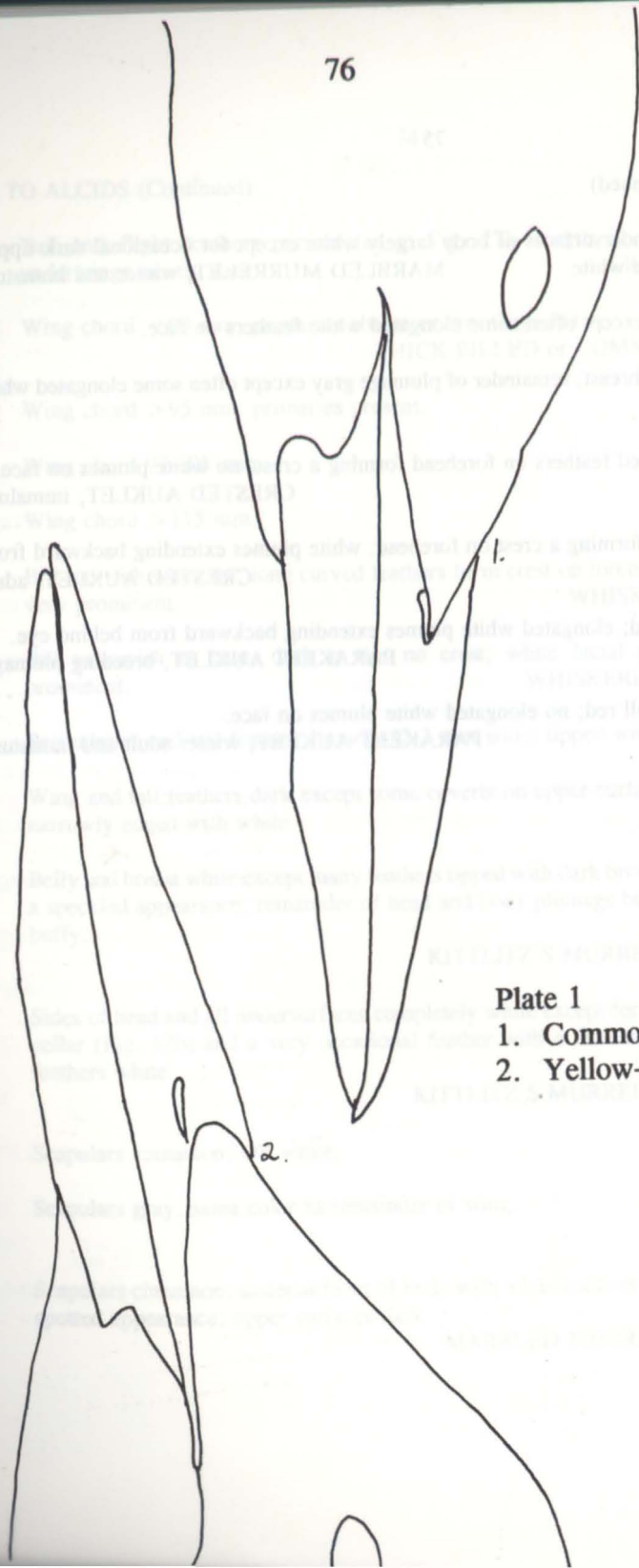


Plate 1

1. Common Loon
2. Yellow-billed Loon

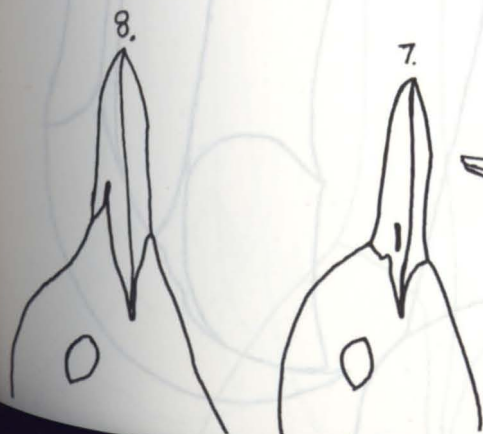
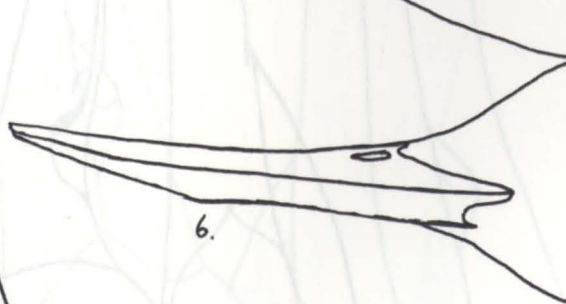
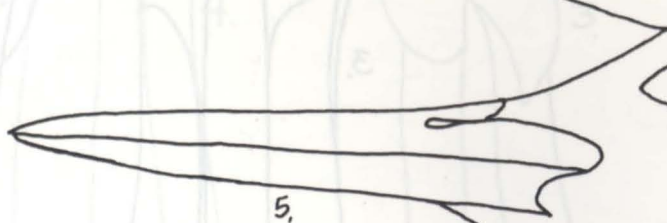
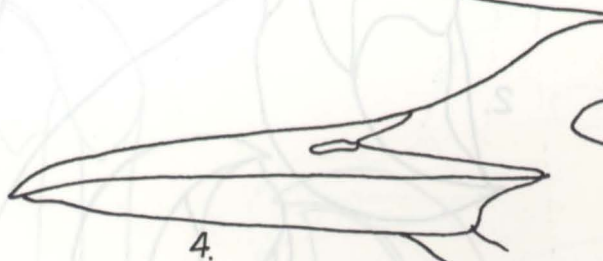
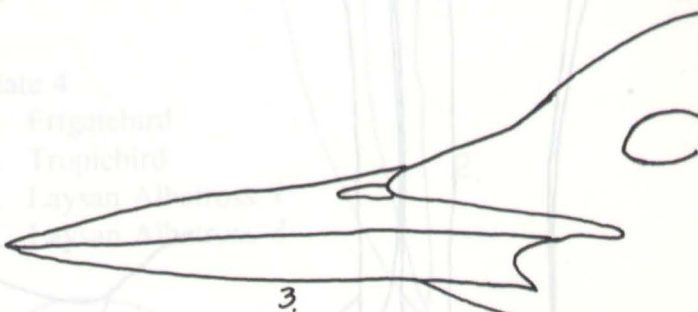
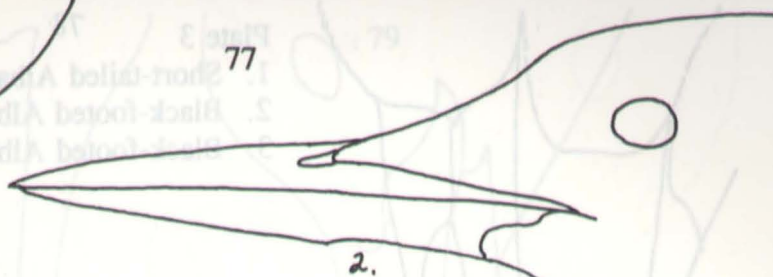


Plate 2

1. Pied-billed Grebe
2. Red-throated Loon
3. Pacific Loon
4. Red-necked Grebe
5. Western or Clark's Grebe ♂
6. Western or Clark's Grebe ♀
7. Eared Grebe
8. Horned Grebe

1. Short-tailed Albatross
2. Black-footed Albatross ♂
3. Black-footed Albatross ♀

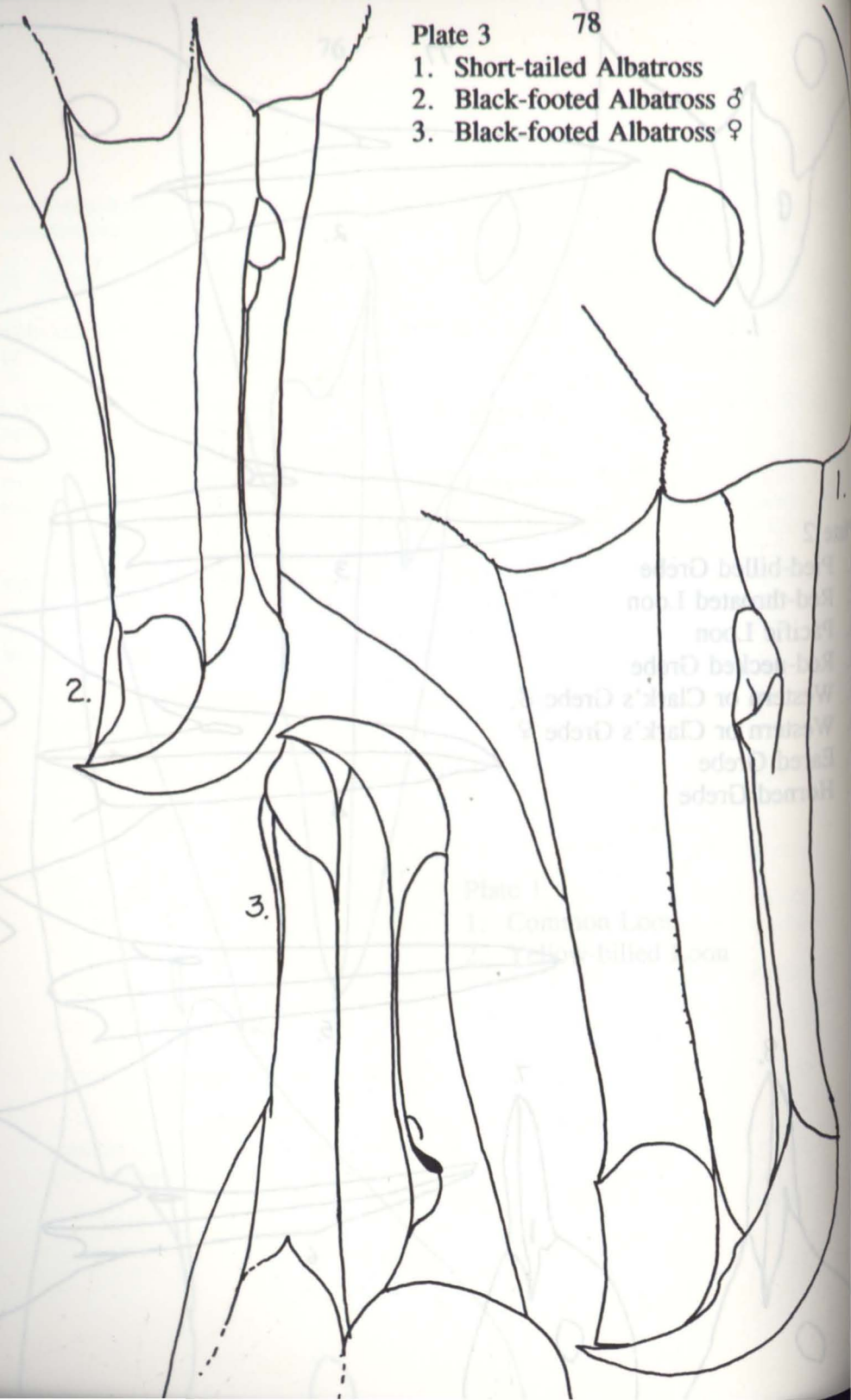


Plate 4

1. Frigatebird
2. Tropicbird
3. Laysan Albatross ♀
4. Laysan Albatross ♂

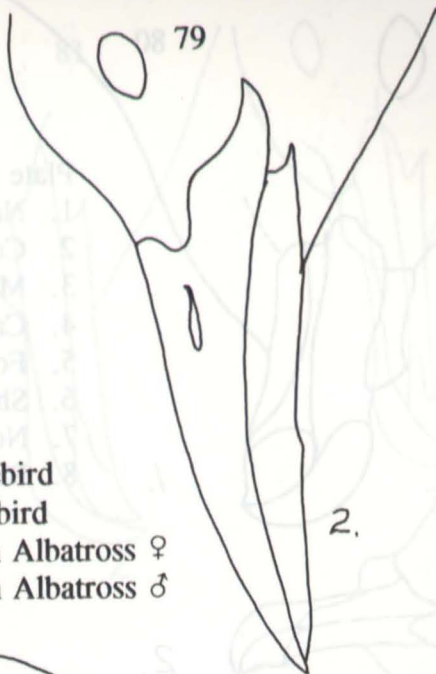
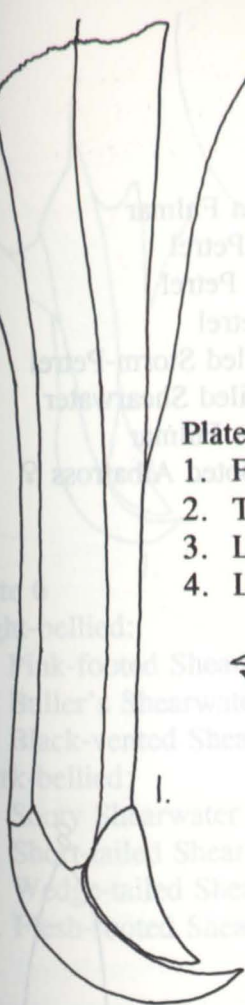


Plate 5

1. Northern Fulmar
2. Cook's Petrel
3. Mottled Petrel
4. Cape Petrel
5. Fork-tailed Storm-Petrel
6. Short-tailed Shearwater
7. Northern Fulmar
8. Black-footed Albatross ♀

1.

2.

3.

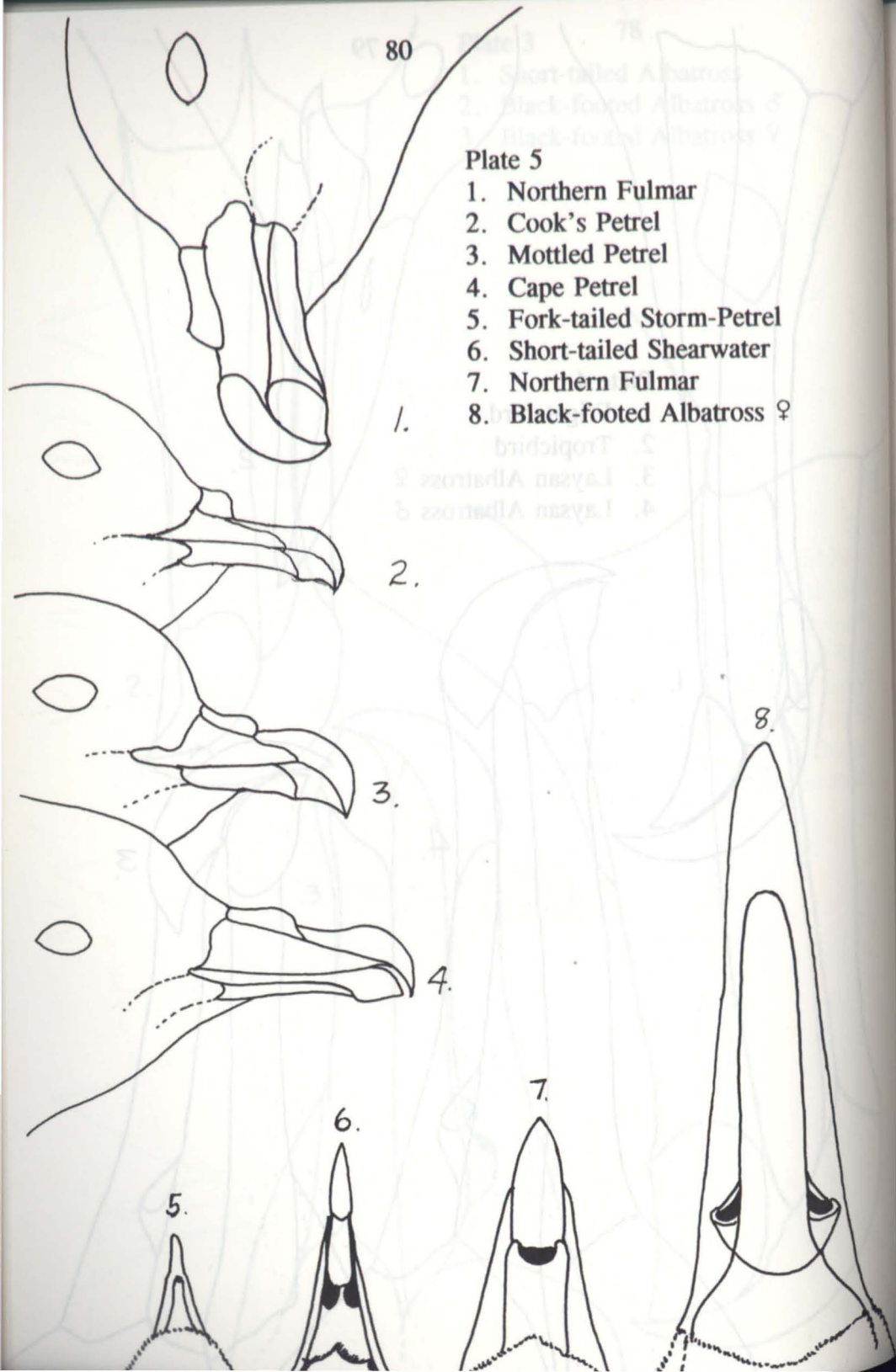
4.

5.

6.

7.

8.



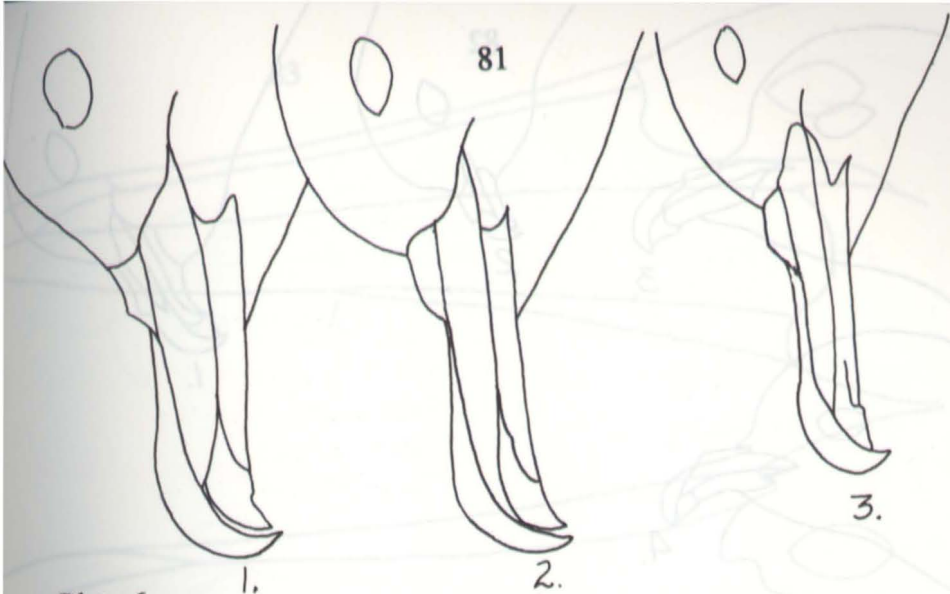


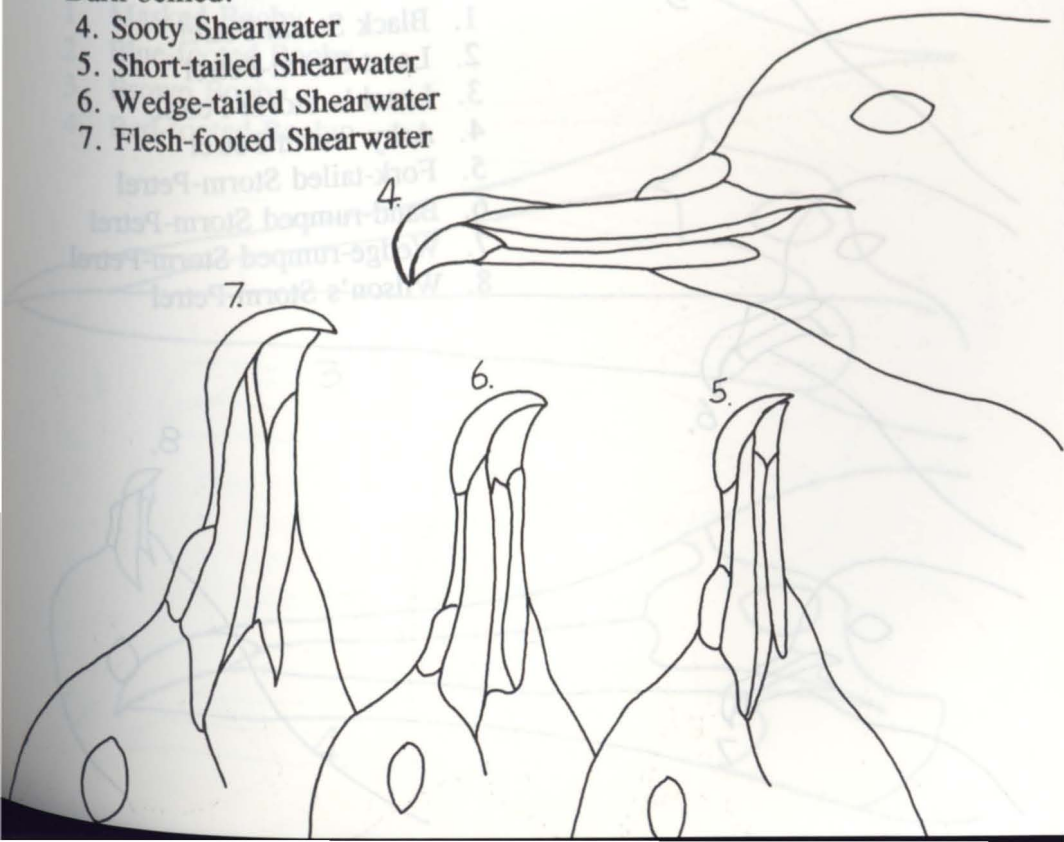
Plate 6

Light-bellied:

1. Pink-footed Shearwater
2. Buller's Shearwater
3. Black-vented Shearwater

Dark-bellied:

4. Sooty Shearwater
5. Short-tailed Shearwater
6. Wedge-tailed Shearwater
7. Flesh-footed Shearwater



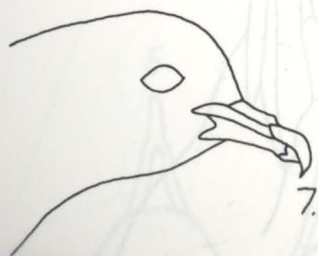


Plate 7

1. Black Storm-Petrel
2. Least Storm-Petrel
3. Leach's Storm-Petrel
4. Ashy Storm-Petrel
5. Fork-tailed Storm-Petrel
6. Band-rumped Storm-Petrel
7. Wedge-rumped Storm-Petrel
8. Wilson's Storm-Petrel



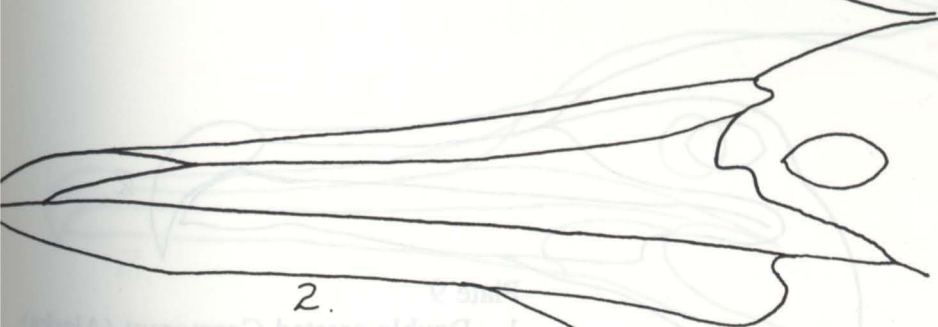
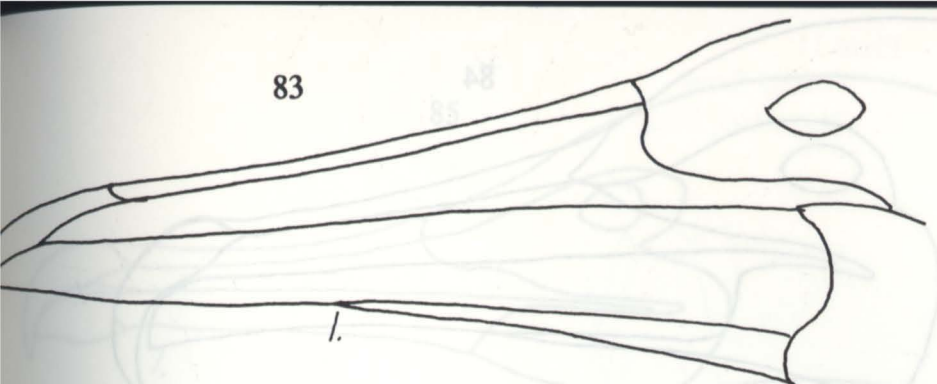
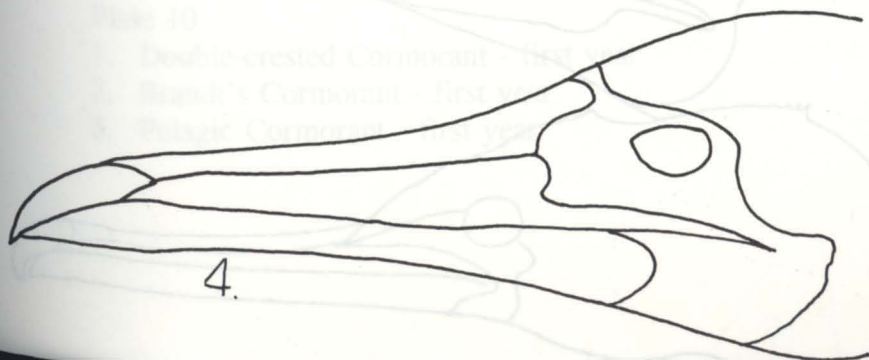
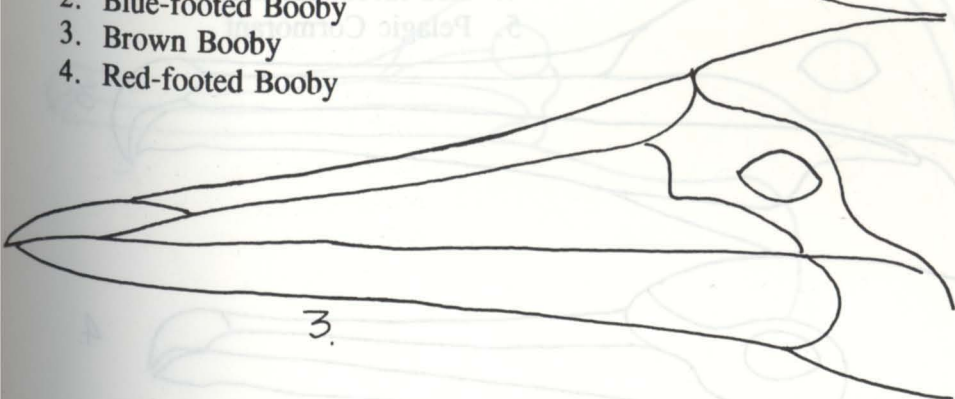


Plate 8

1. Masked Booby
2. Blue-footed Booby
3. Brown Booby
4. Red-footed Booby



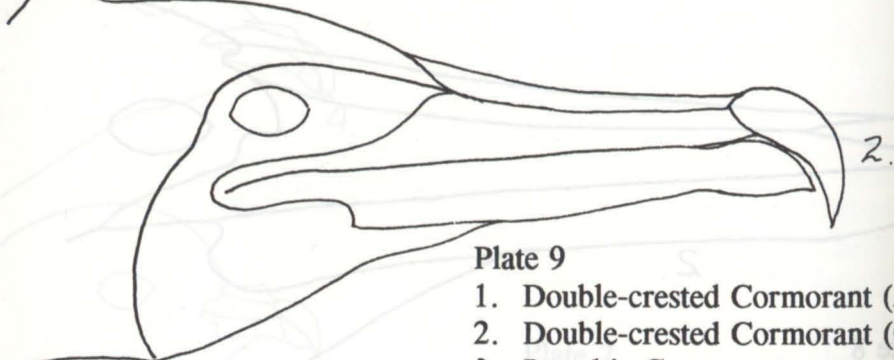
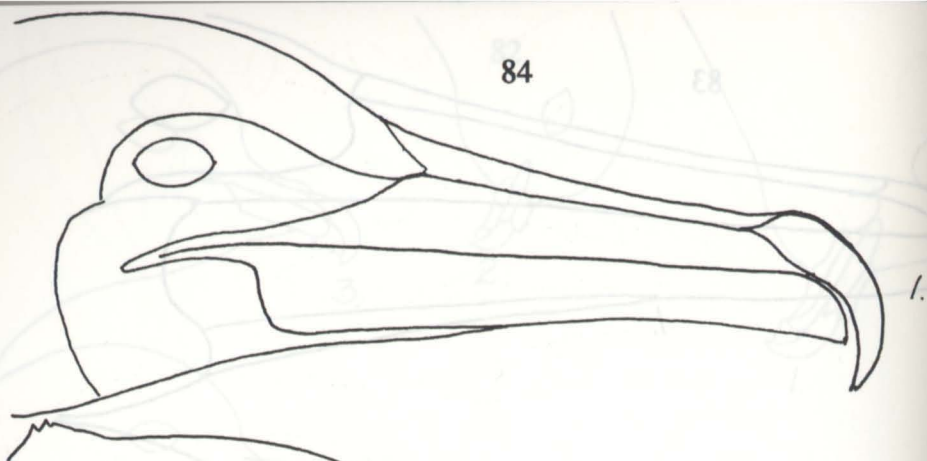
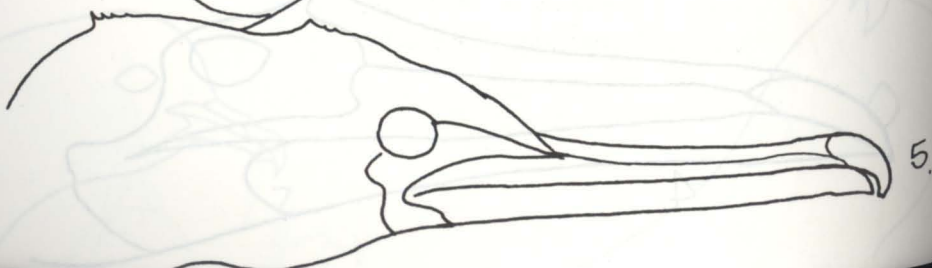
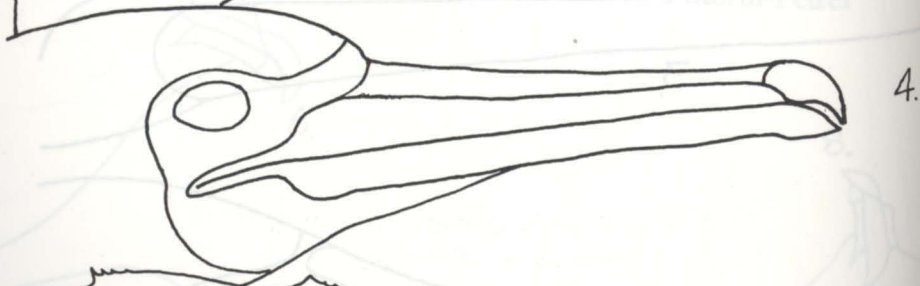
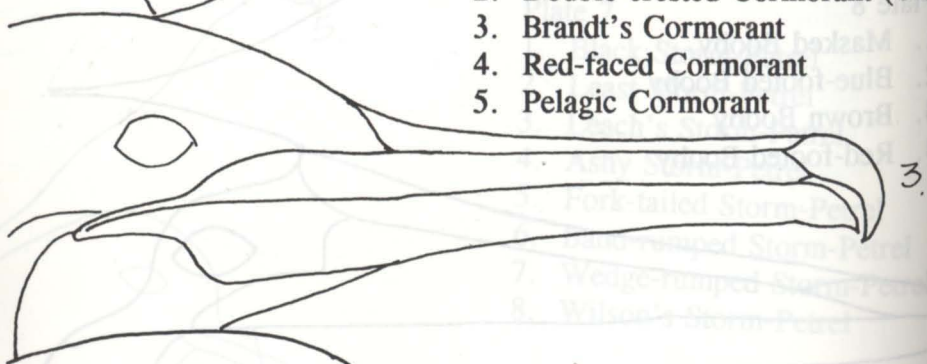


Plate 9

1. Double-crested Cormorant (Alaska)
2. Double-crested Cormorant (California)
3. Brandt's Cormorant
4. Red-faced Cormorant
5. Pelagic Cormorant



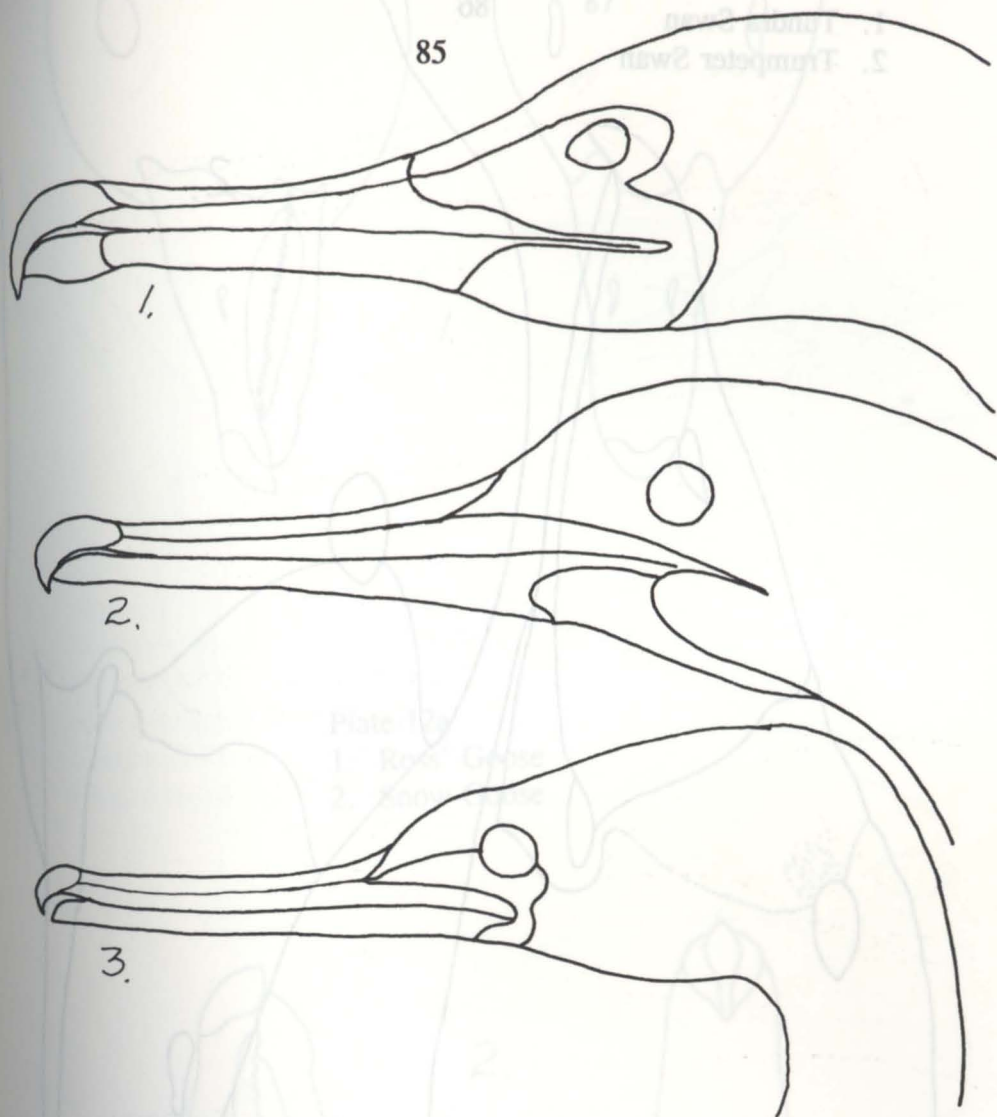


Plate 10

1. Double-crested Cormorant - first year
2. Brandt's Cormorant - first year
3. Pelagic Cormorant - first year

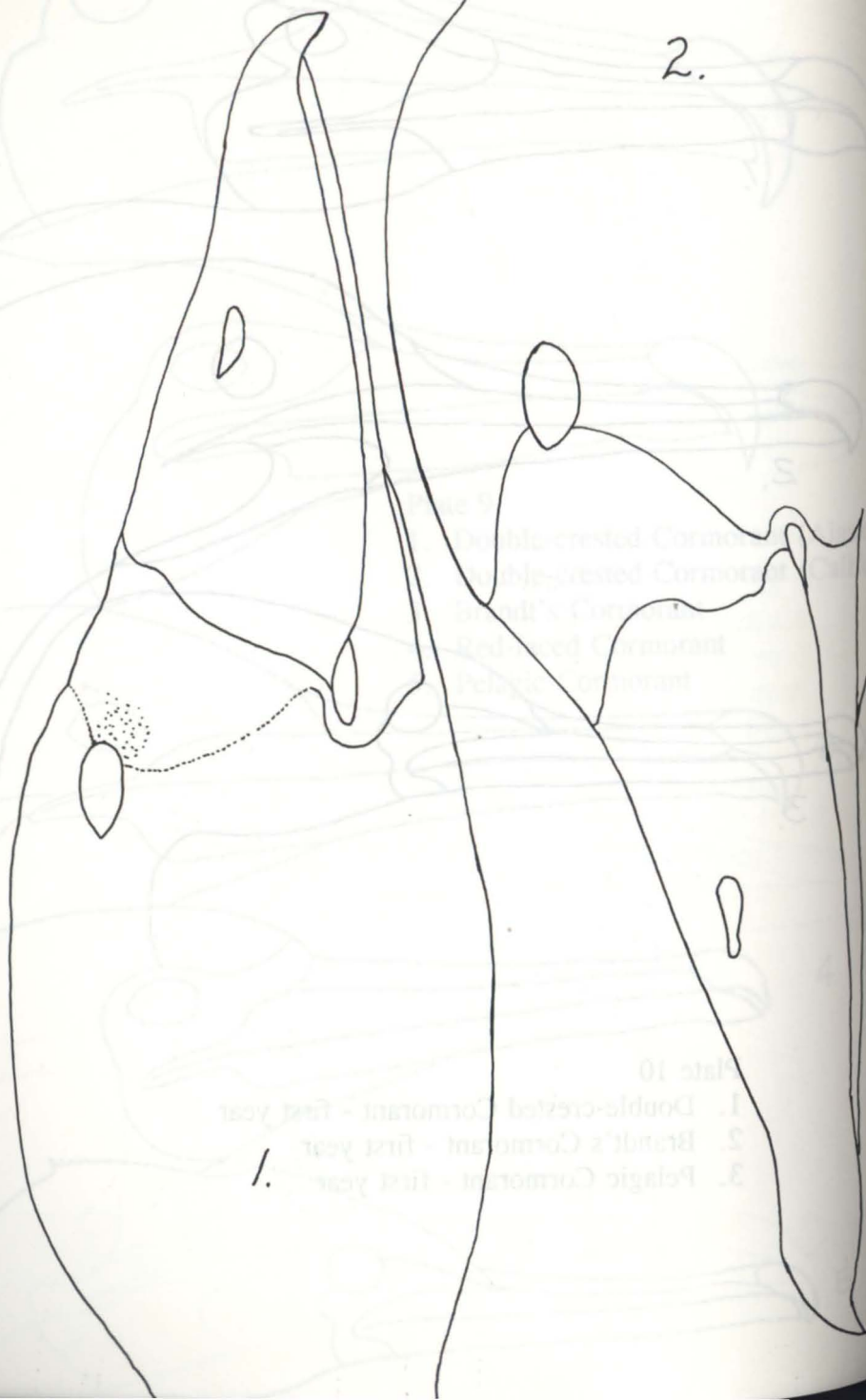
Plate 11

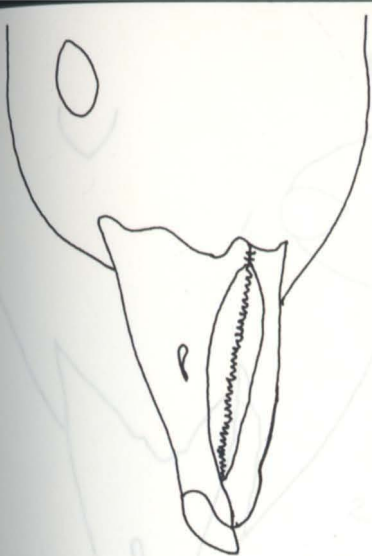
1. Tundra Swan

2. Trumpeter Swan

86

2.





1.

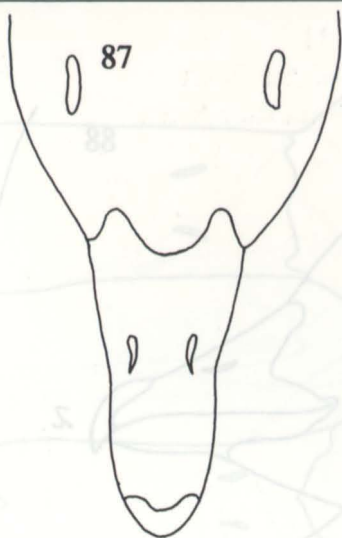
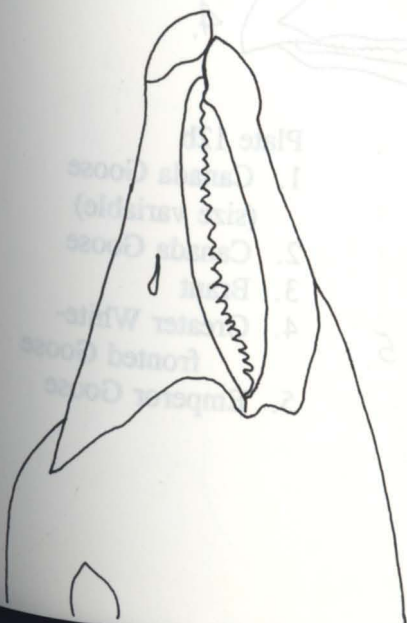


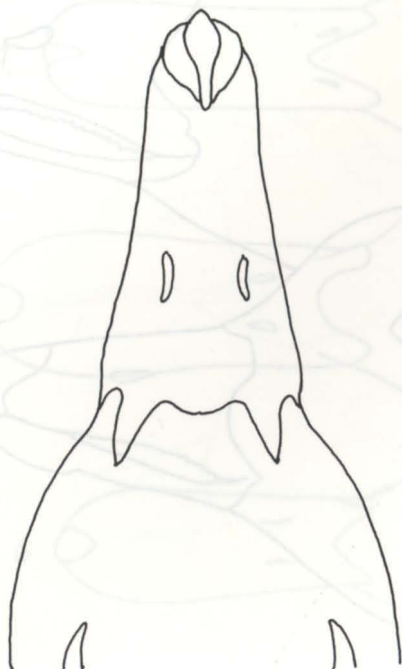
Plate 12a

1. Ross' Goose

2. Snow Goose



2.



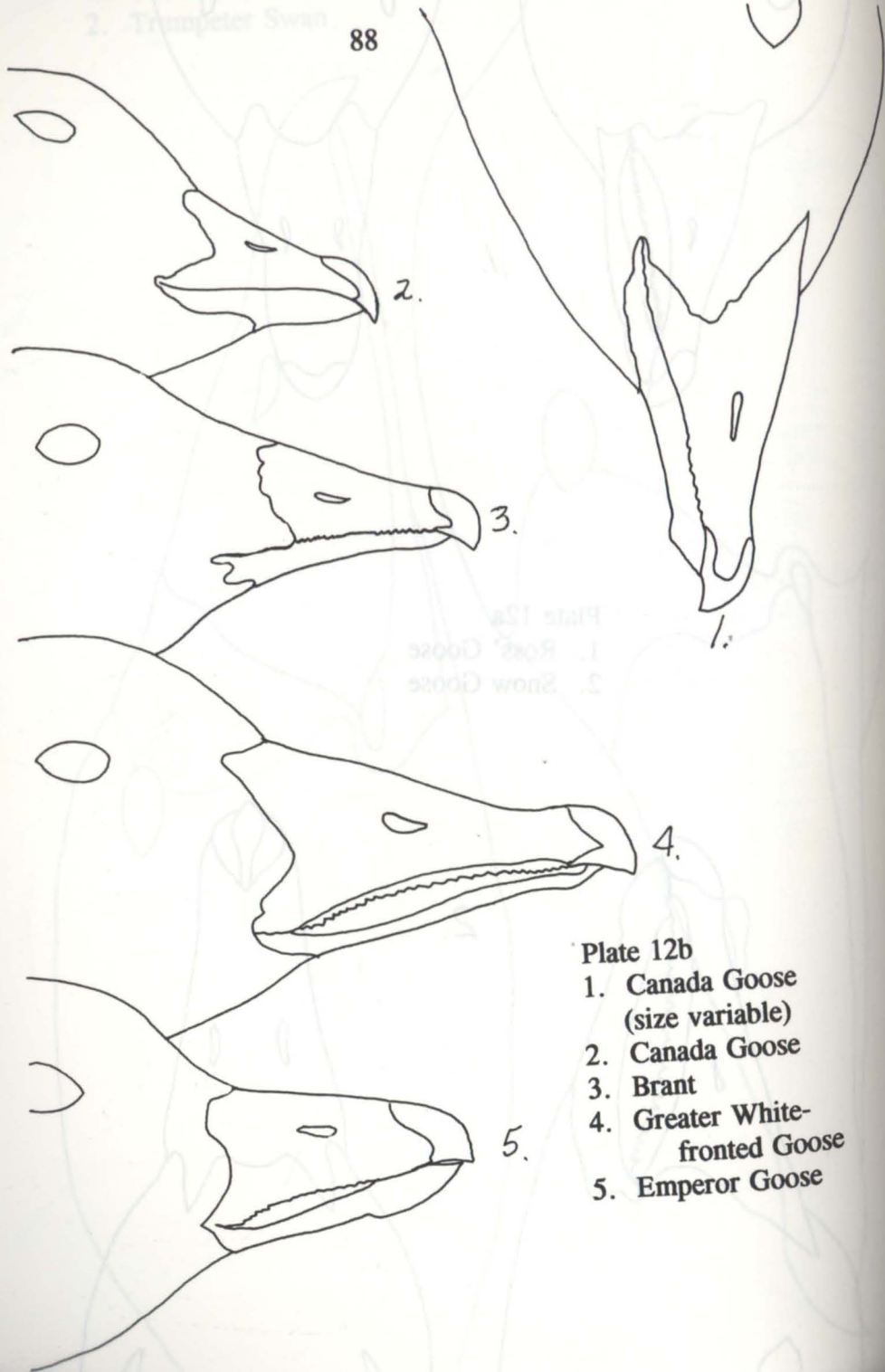


Plate 12b

1. Canada Goose
(size variable)
2. Canada Goose
3. Brant
4. Greater White-fronted Goose
5. Emperor Goose

1.

2.

3.

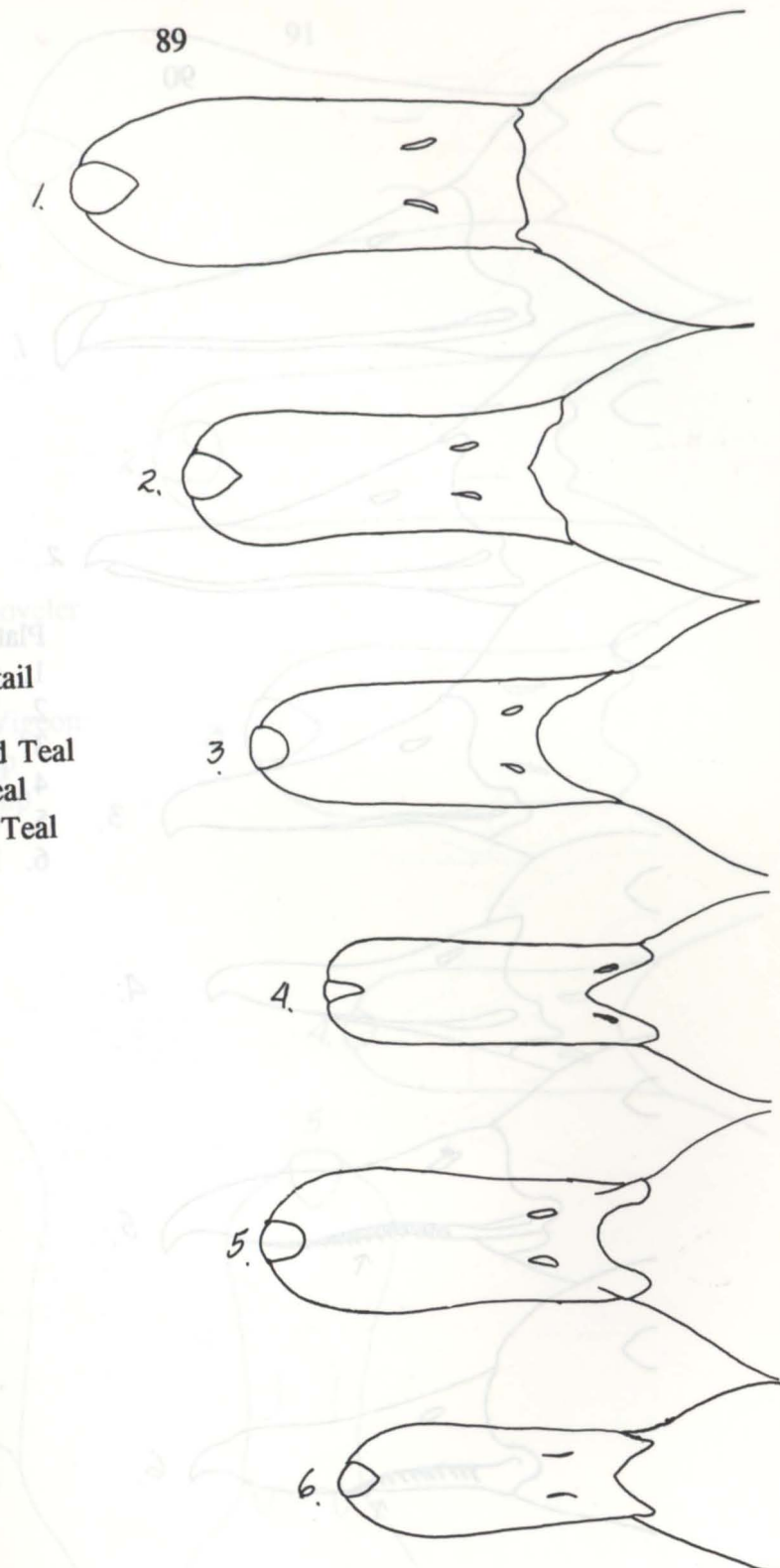
4.

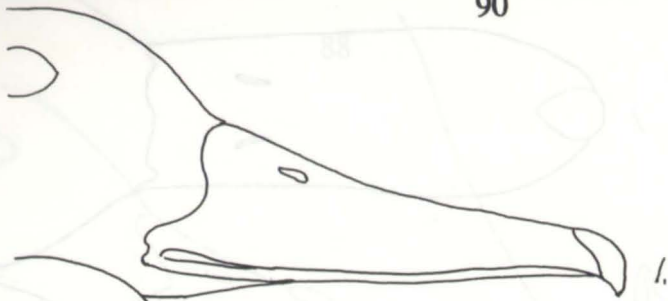
5.

6.

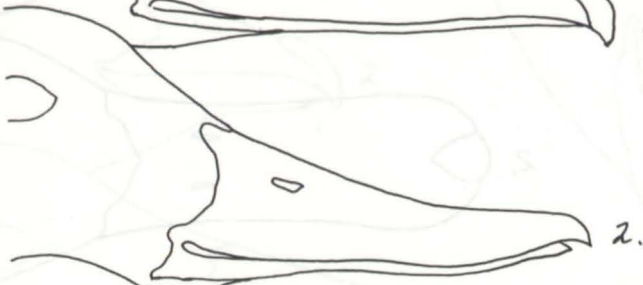
Plate 13a

1. Mallard
2. Northern Pintail
3. Gadwall
4. Green-winged Teal
5. Cinnamon Teal
6. Blue-winged Teal

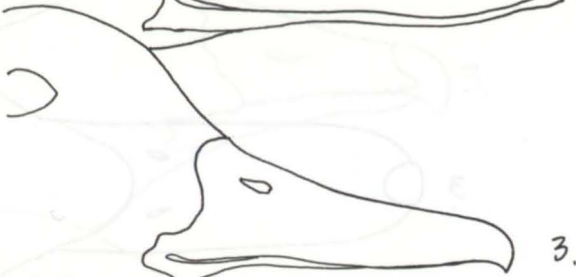




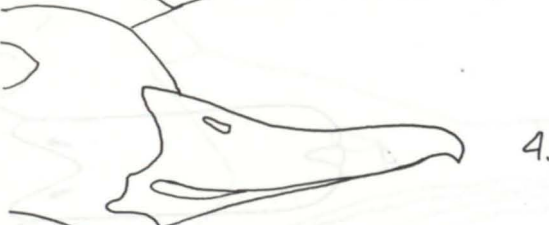
1.



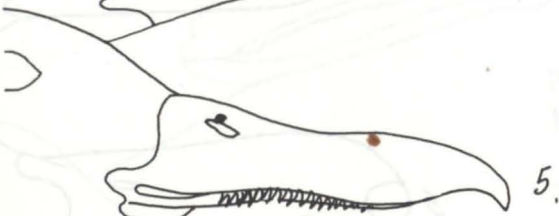
2.



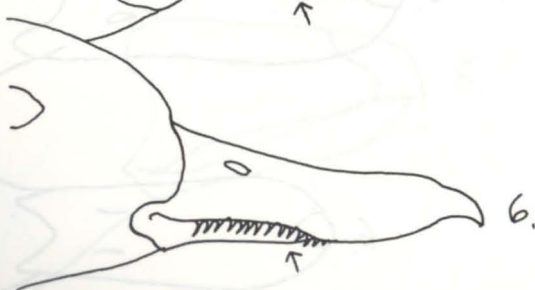
3.



4.



5.



6.

Plate 13b

1. Mallard
2. Northern Pintail
3. Gadwall
4. Green-winged Teal
5. Cinnamon Teal
6. Blue-winged Teal

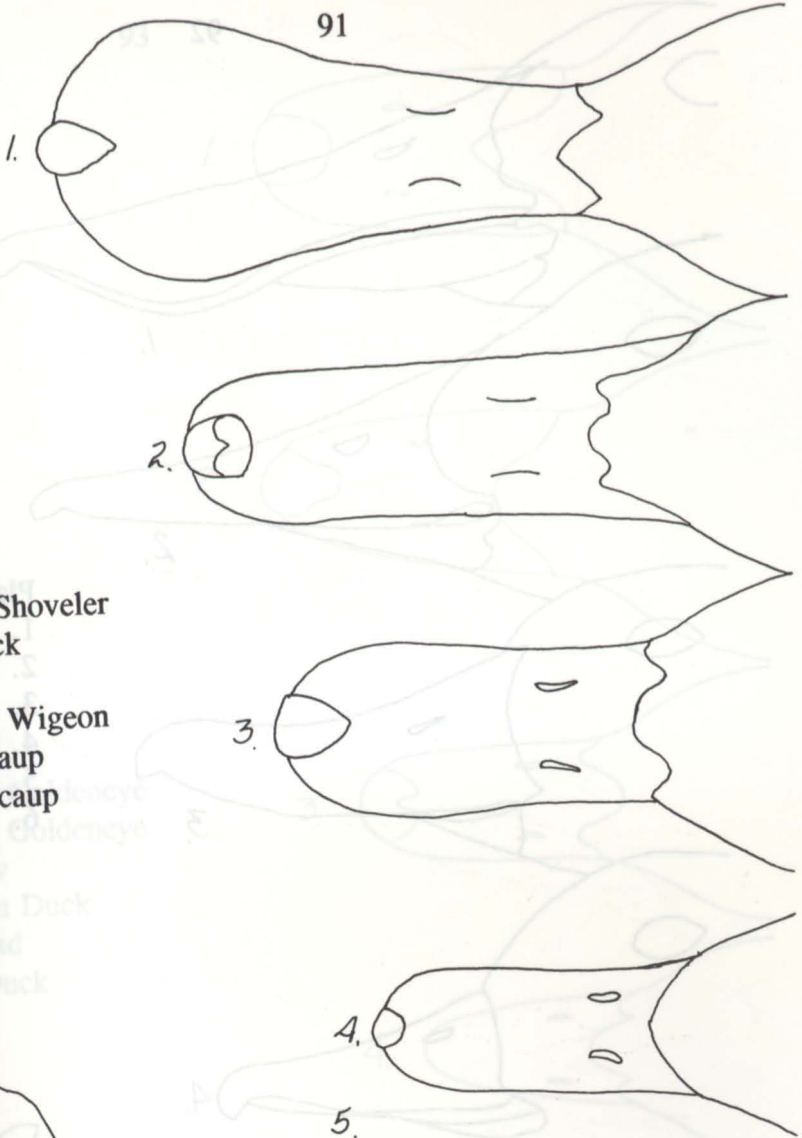
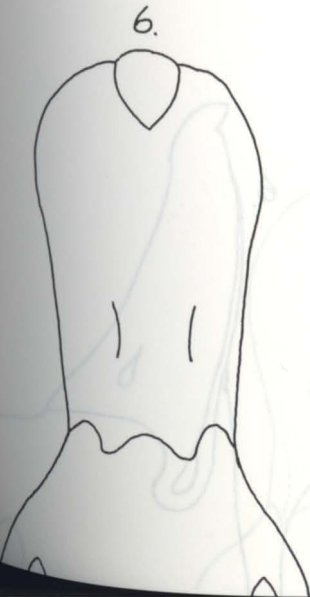


Plate 14a

1. Northern Shoveler
2. Canvasback
3. Redhead
4. American Wigeon
5. Lesser Scaup
6. Greater Scaup



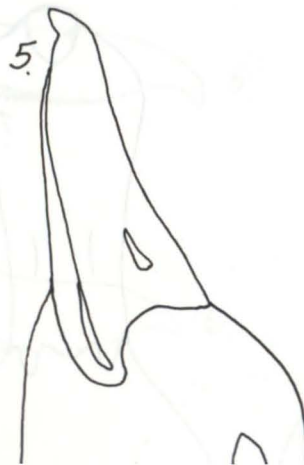
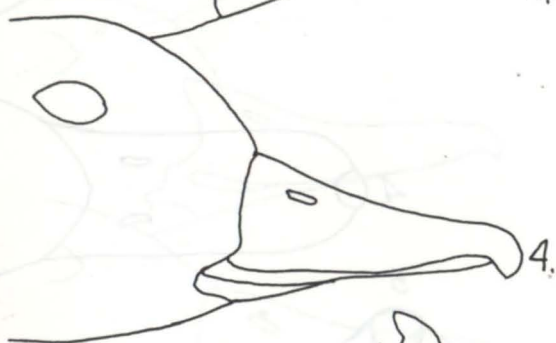
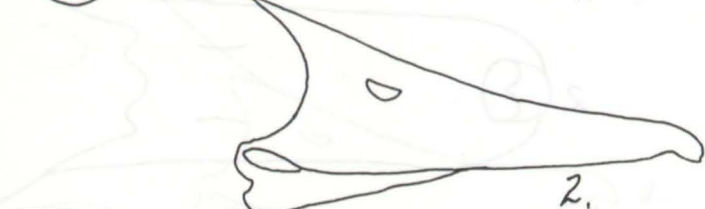
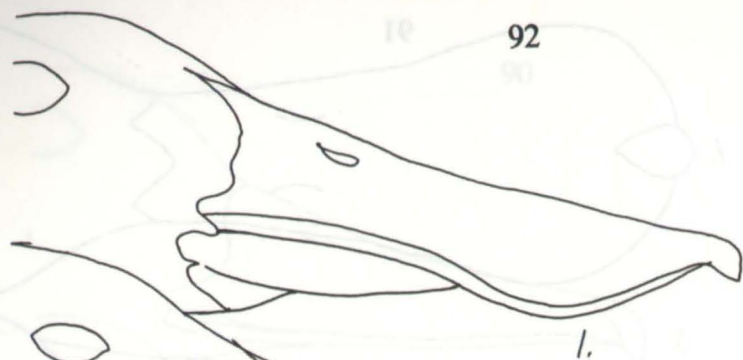
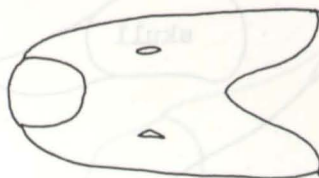


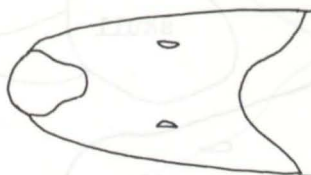
Plate 14b

1. Northern Shoveler
2. Canvasback
3. Redhead
4. American Wigeon
5. Lesser Scaup
6. Greater Scaup

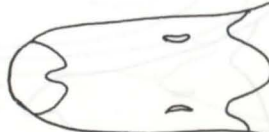
1.



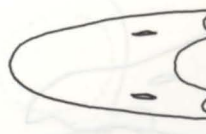
2.



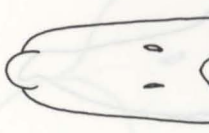
3.



4.



5.



6.

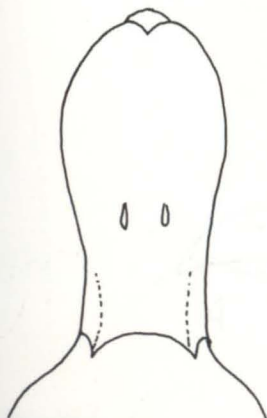


Plate 15a

1. Common Goldeneye
2. Barrow's Goldeneye
3. Oldsquaw
4. Harlequin Duck
5. Bufflehead
6. Ruddy Duck

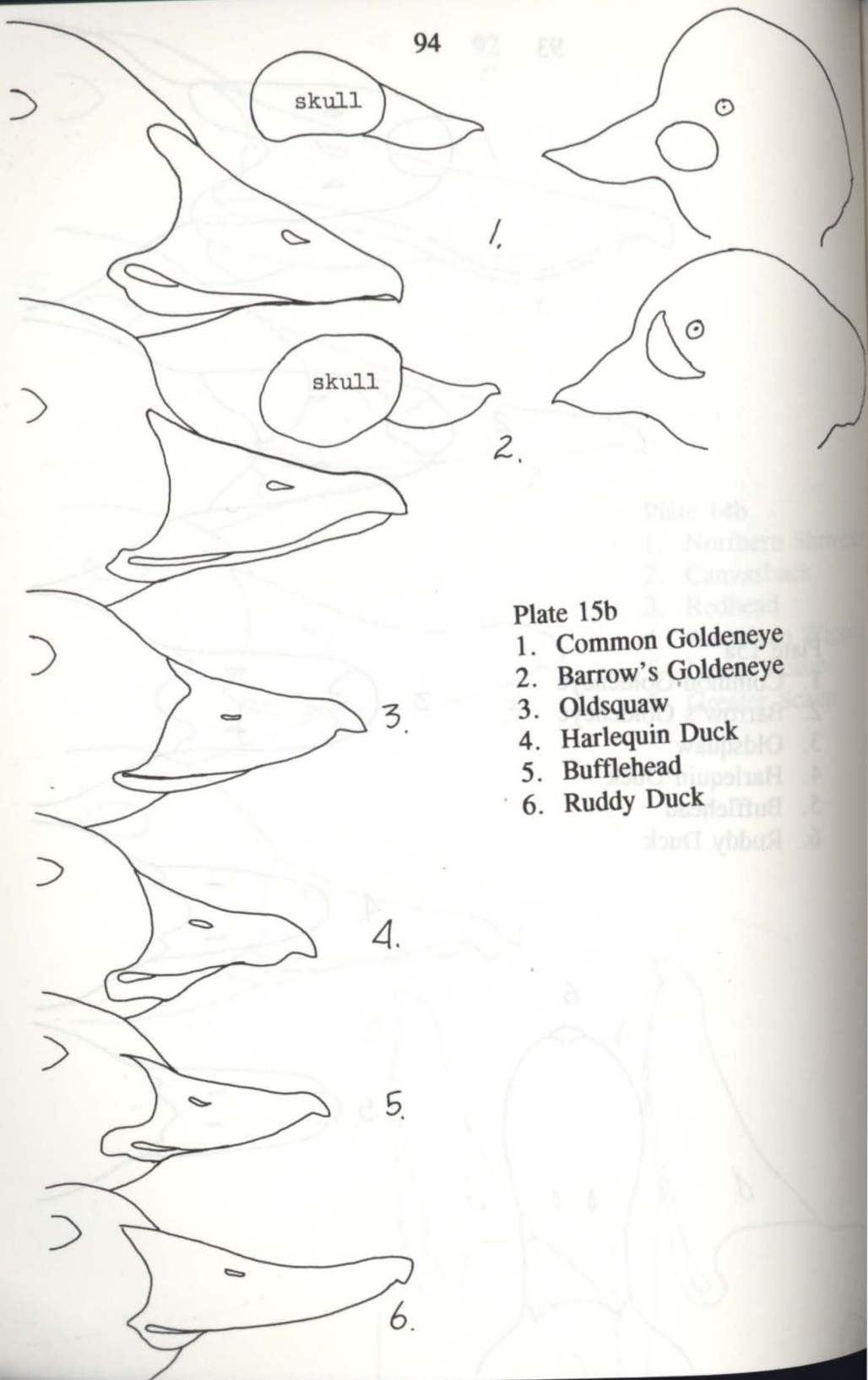
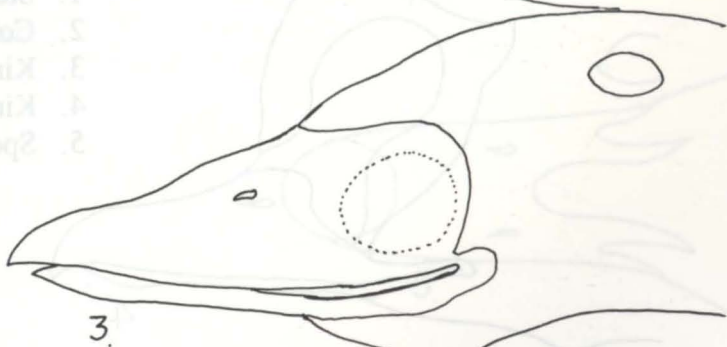


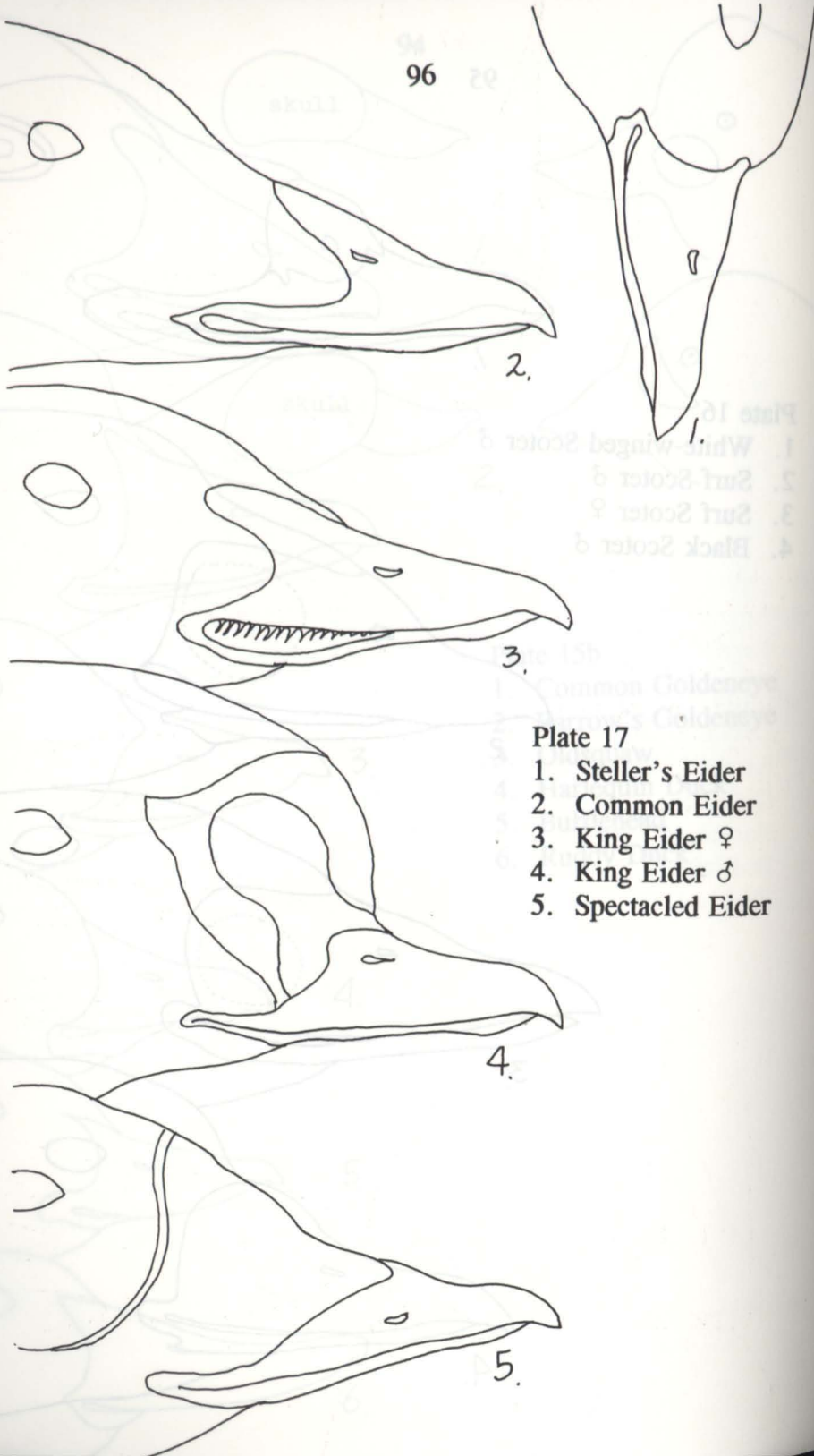
Plate 15b

1. Common Goldeneye
2. Barrow's Goldeneye
3. Oldsquaw
4. Harlequin Duck
5. Bufflehead
6. Ruddy Duck

Plate 16

1. White-winged Scoter ♂
2. Surf Scoter ♂
3. Surf Scoter ♀
4. Black Scoter ♂





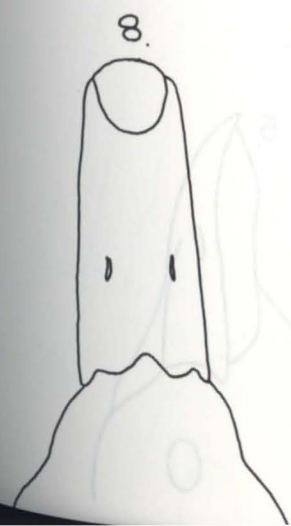
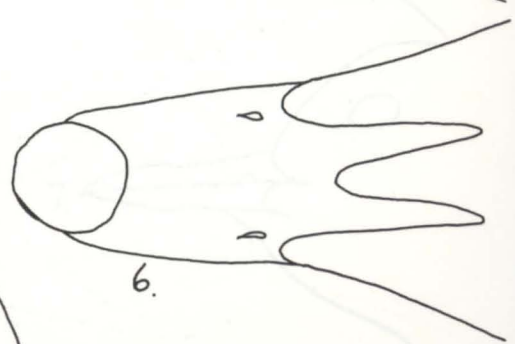
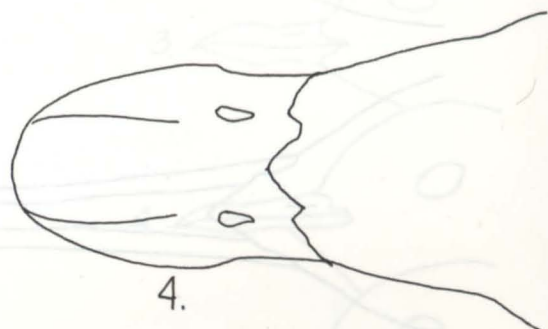
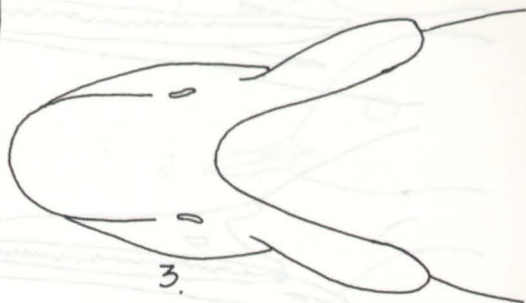
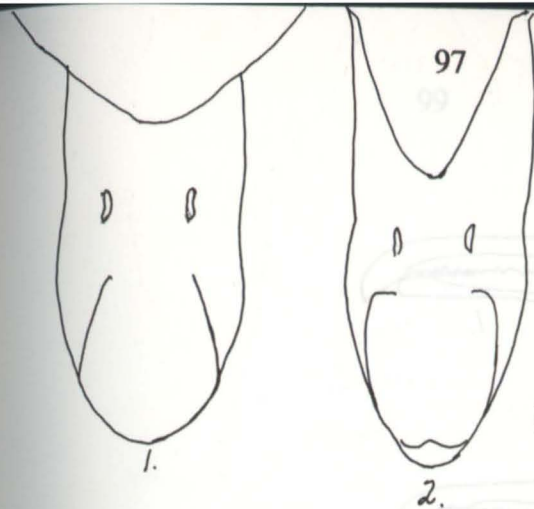


Plate 18

1. Black Scoter
2. Surf Scoter ♀
3. Surf Scoter ♂
4. White-winged scoter
5. King Eider ♀
6. Common Eider
7. Spectacled Eider
8. Steller's Eider

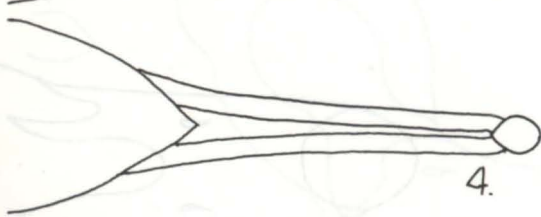
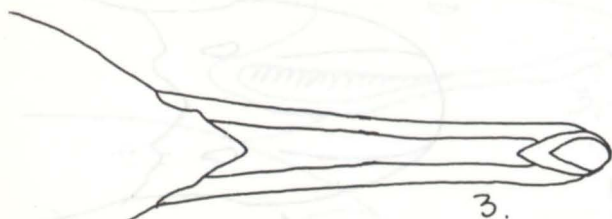
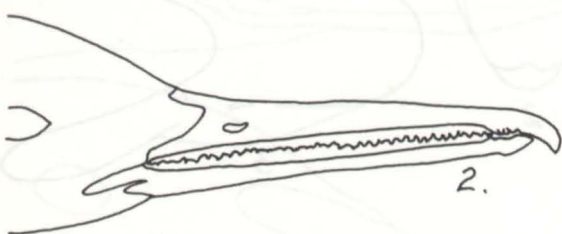


Plate 19

1. Common Merganser
2. Red-breasted Merganser
3. Common Merganser
4. Red-breasted Merganser
5. American Coot

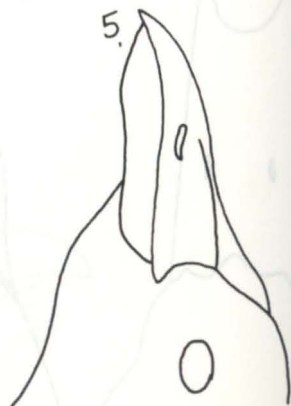
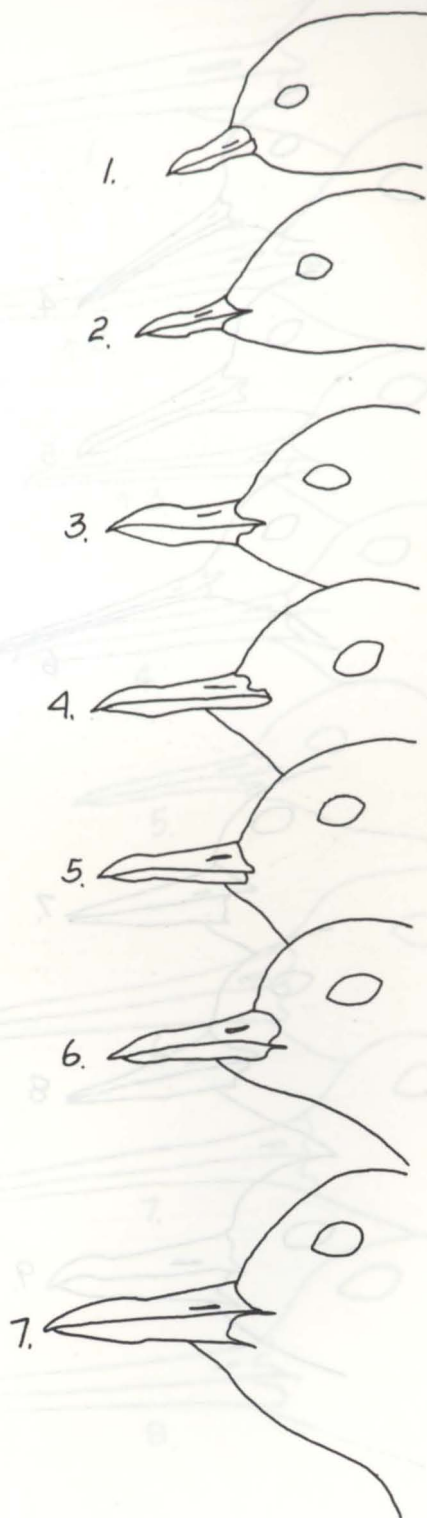


Plate 20

1. Semipalmated Plover
2. Snowy Plover
3. Wilson's Plover
4. Mountain Plover
5. Killdeer
6. American or Pacific Golden Plover
7. Black-bellied Plover



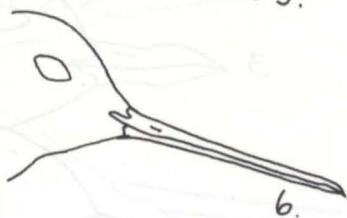
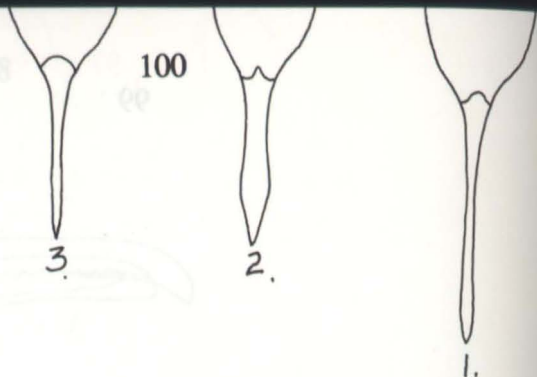
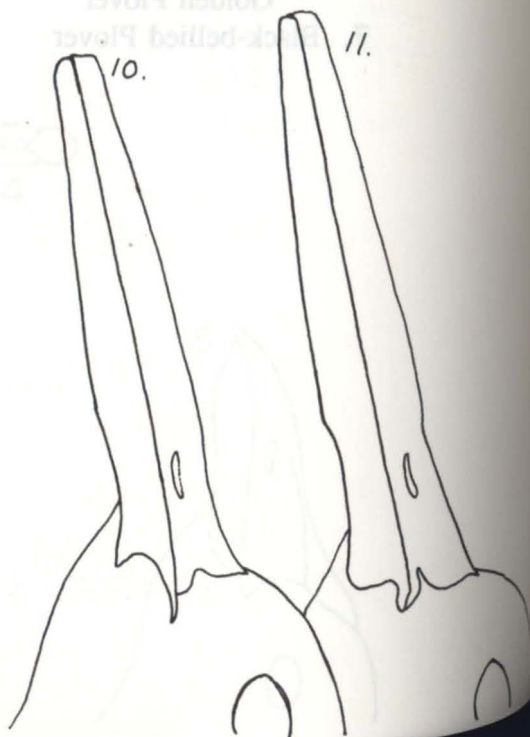
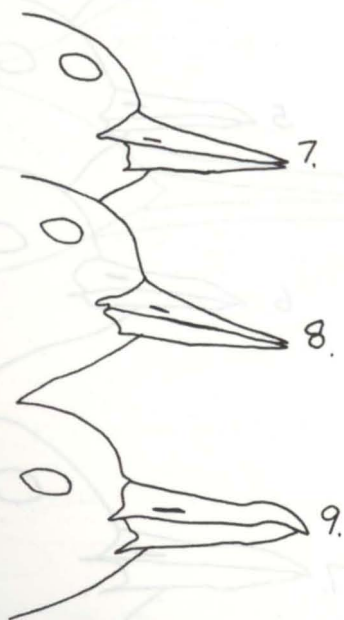


Plate 21

1. Wilson's Phalarope
2. Red Phalarope
3. Red-necked Phalarope
4. Red-necked Phalarope
5. Red Phalarope
6. Wilson's Phalarope
7. Ruddy Turnstone
8. Black Turnstone
9. Surfbird
10. American Oystercatcher
11. Black Oystercatcher



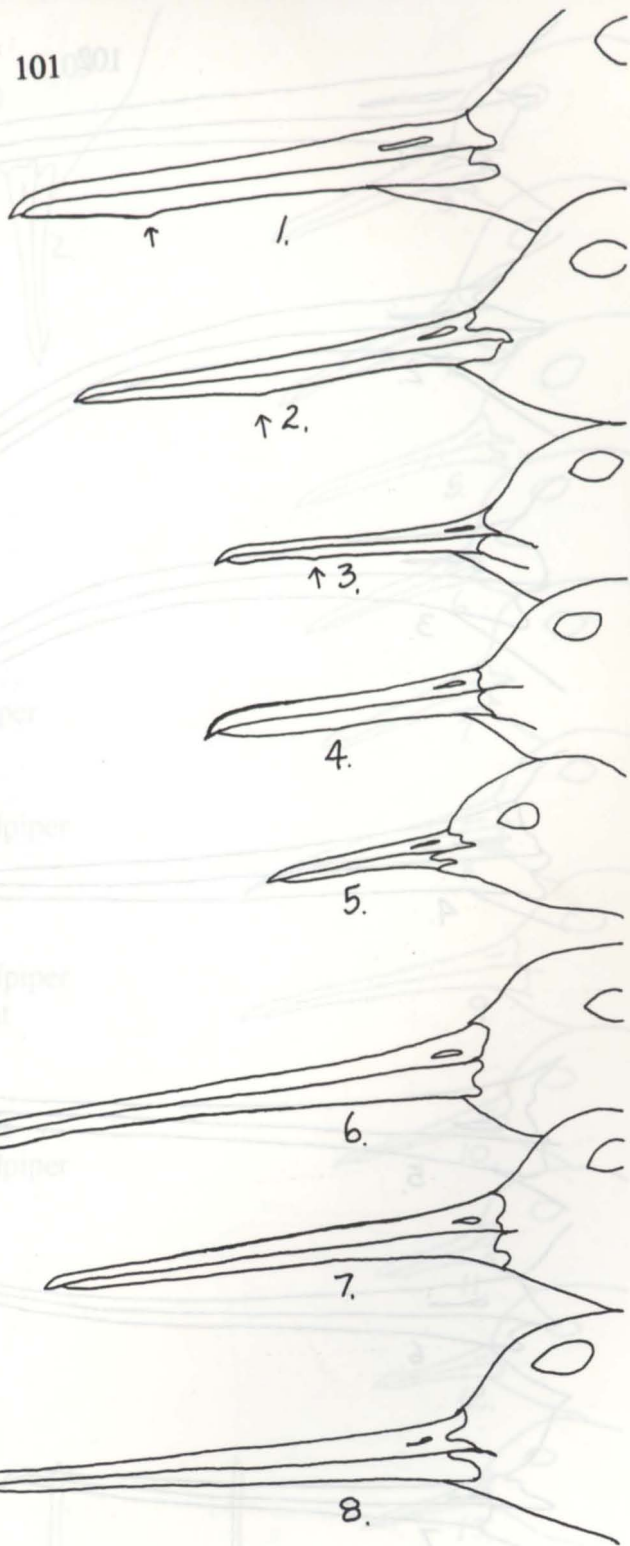


Plate 22

1. Willet
2. Greater Yellowlegs
3. Lesser Yellowlegs
4. Wandering Tattler
5. Spotted Sandpiper
6. Long-billed Dowitcher
7. Short-billed Dowitcher
8. Common Snipe

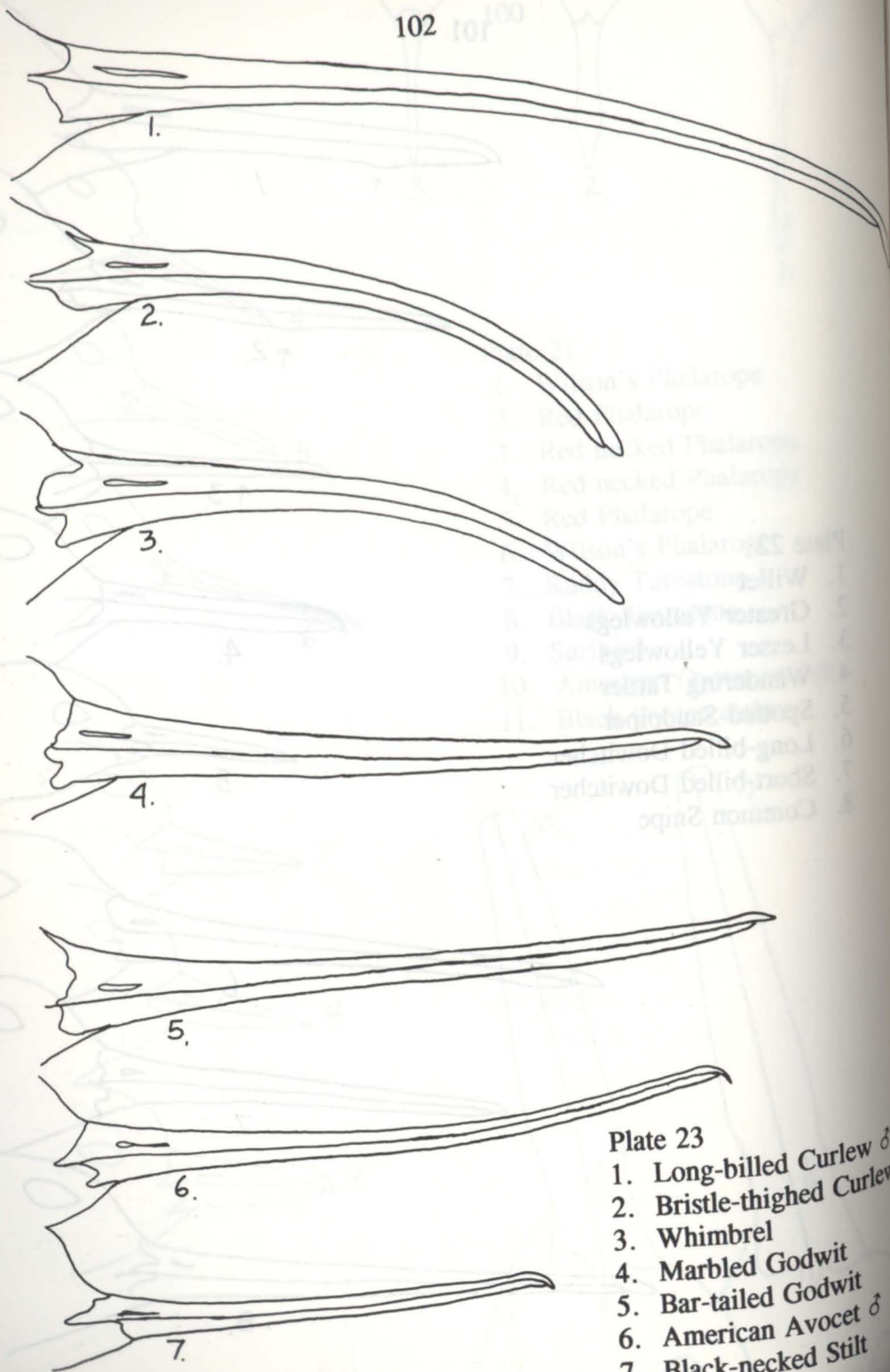


Plate 23

1. Long-billed Curlew ♂
2. Bristle-thighed Curlew ♀
3. Whimbrel
4. Marbled Godwit
5. Bar-tailed Godwit
6. American Avocet ♂
7. Black-necked Stilt

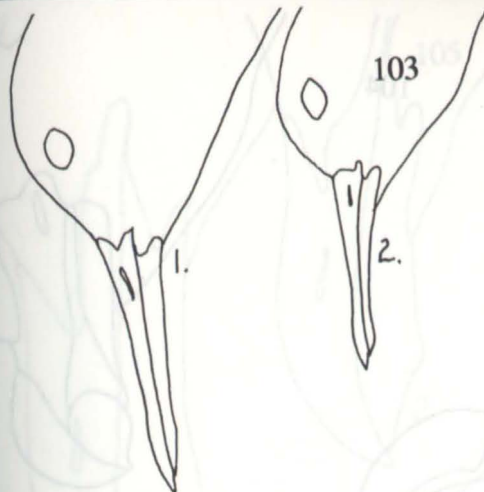
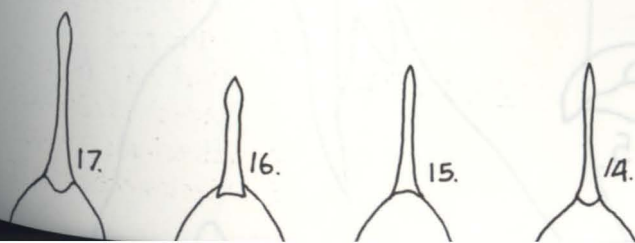
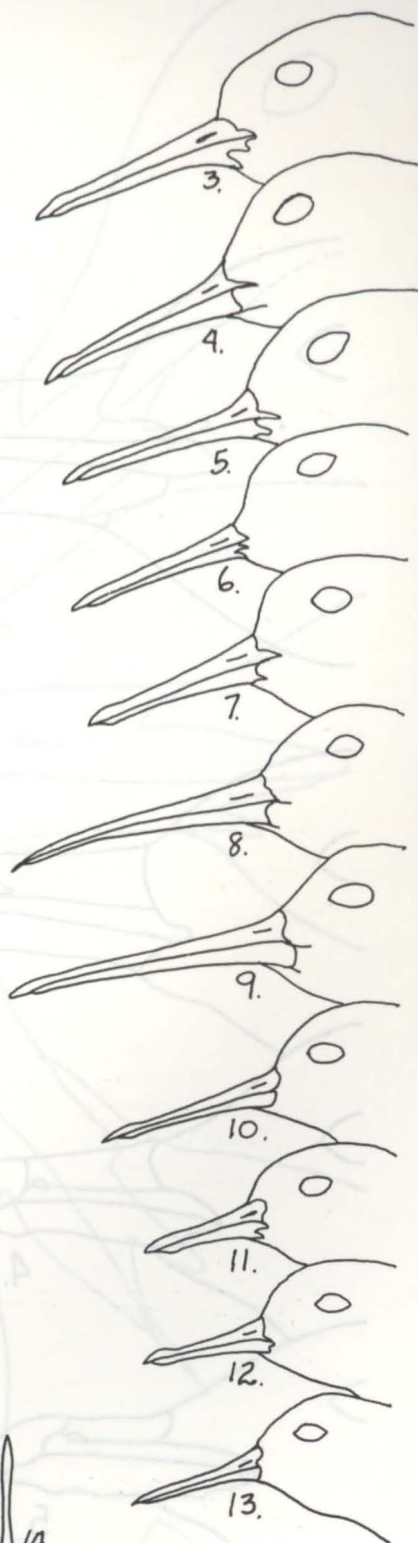


Plate 24

1. Red Knot
2. Sanderling
3. Rock Sandpiper
4. Sharp-tailed Sandpiper
5. Pectoral Sandpiper
6. Baird's Sandpiper
7. White-rumped Sandpiper
8. Curlew Sandpiper
9. Dunlin
10. Western Sandpiper
11. Semipalmated Sandpiper
12. Rufous-necked Stint
13. Least Sandpiper
14. Least Sandpiper
15. Rufous-necked Stint
16. Semipalmated Sandpiper
17. Western Sandpiper





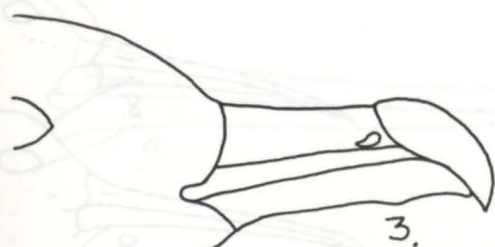
1.



2.

Plate 25

1. Northern Fulmar
(for comparison)
2. South Polar Skua
3. Pomarine Jaeger
4. Parasitic Jaeger
5. Long-tailed Jaeger



3.



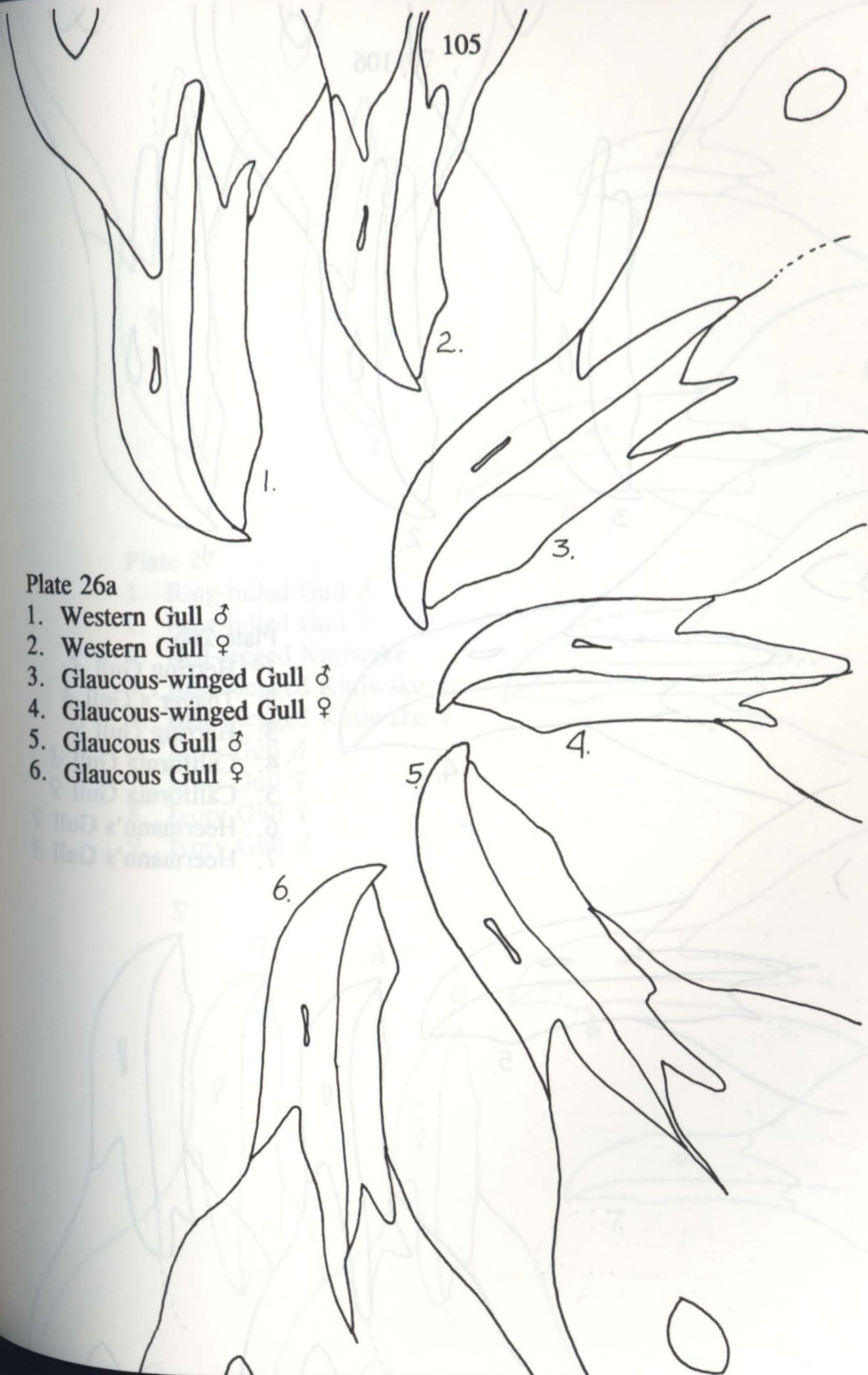
4.



5.

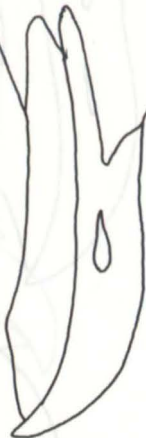
Plate 26a

1. Western Gull ♂
2. Western Gull ♀
3. Glaucous-winged Gull ♂
4. Glaucous-winged Gull ♀
5. Glaucous Gull ♂
6. Glaucous Gull ♀





3.



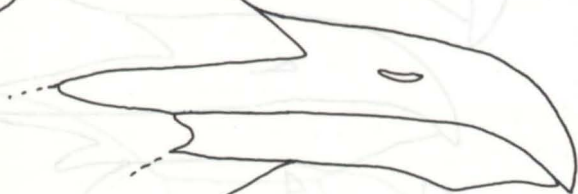
2.



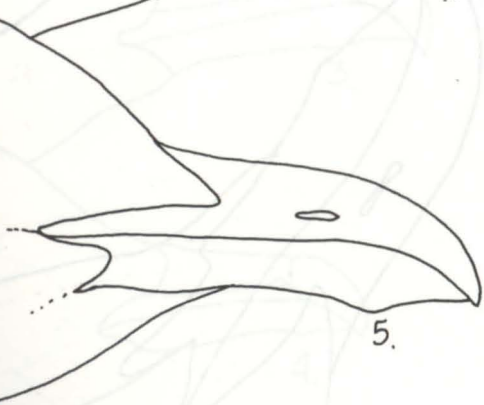
1.

Plate 26b

1. Herring Gull ♂
2. Thayer's Gull ♂
3. Herring Gull ♀
4. California Gull ♂
5. California Gull ♀
6. Heermann's Gull ♀
7. Heermann's Gull ♂



4.

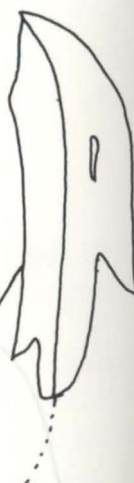


5.

6.



7.



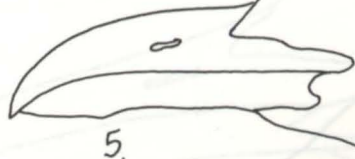
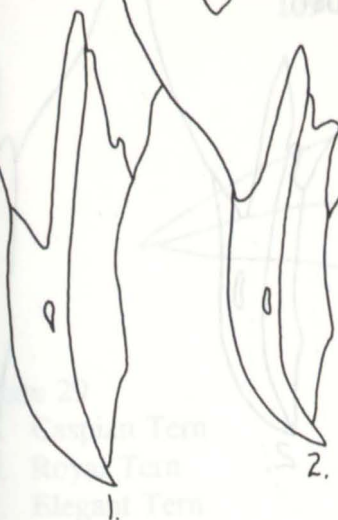
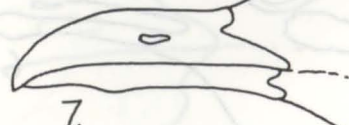
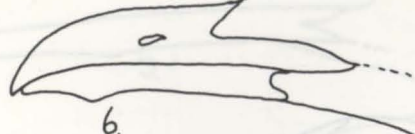


Plate 27

1. Ring-billed Gull ♂
2. Ring-billed Gull ♀
3. Red-legged Kittiwake
4. Black-legged Kittiwake ♂
5. Black-legged Kittiwake ♀
6. Mew Gull ♂
7. Mew Gull ♀
8. Ivory Gull ♀
9. Ivory Gull ♂



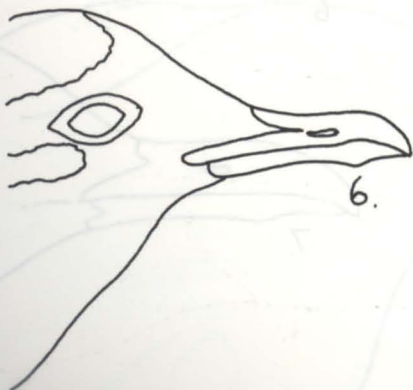
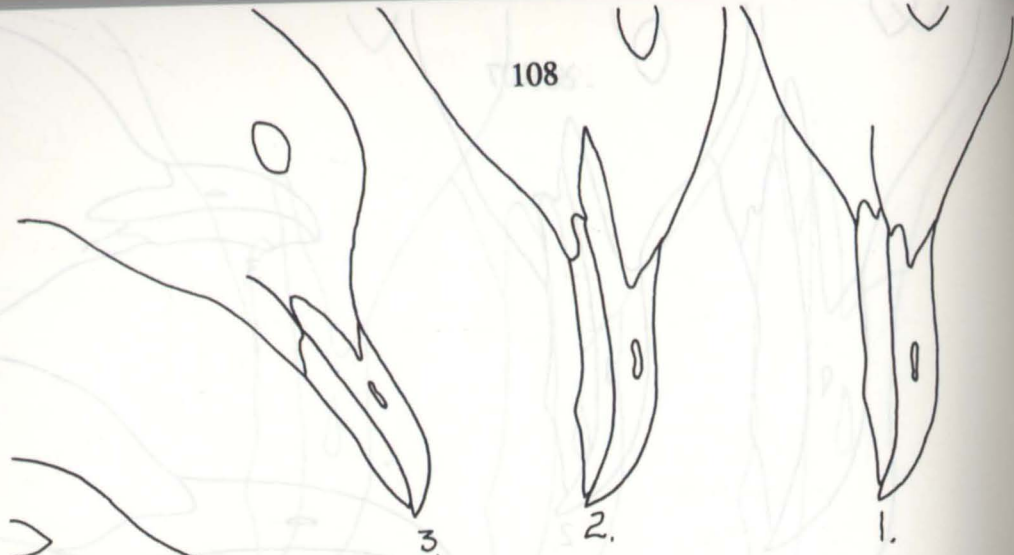


Plate 28

1. Common Black-headed Gull
2. Laughing Gull
3. Franklin's Gull
4. Sabine's Gull
5. Ross' Gull
6. Little Gull
7. Bonaparte's Gull



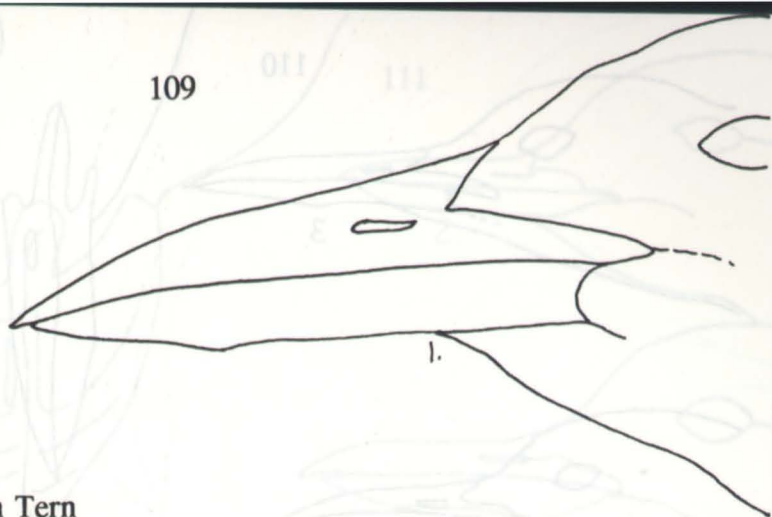
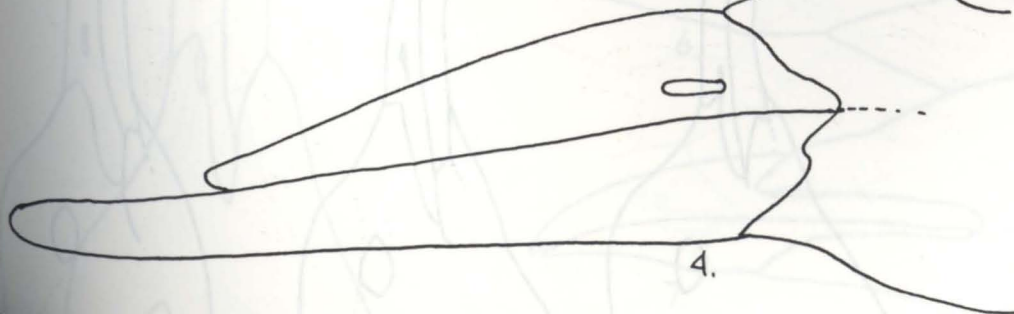
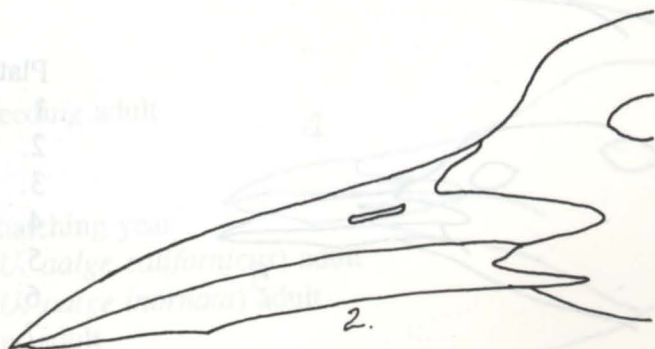


Plate 29

1. Caspian Tern
2. Royal Tern
3. Elegant Tern
4. Black Skimmer



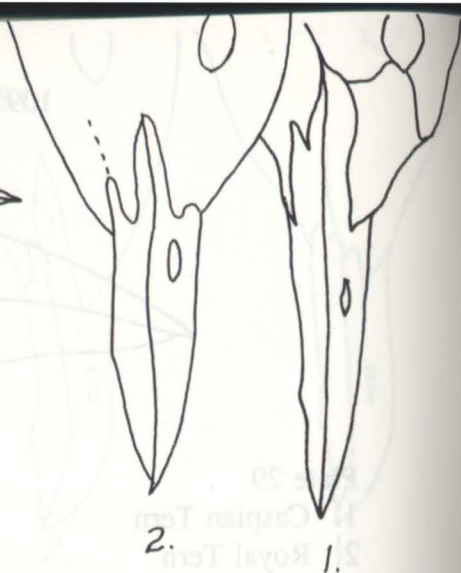
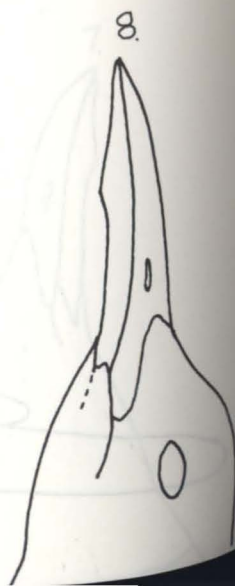
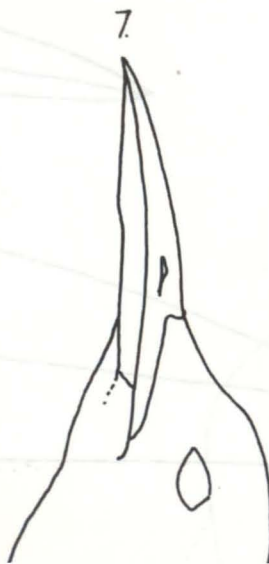
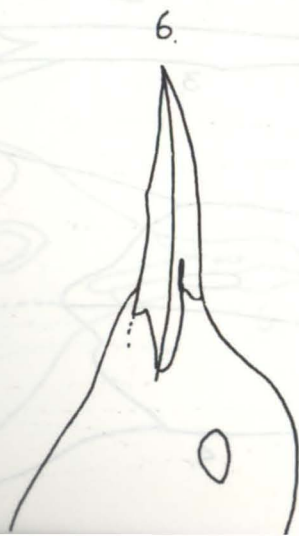
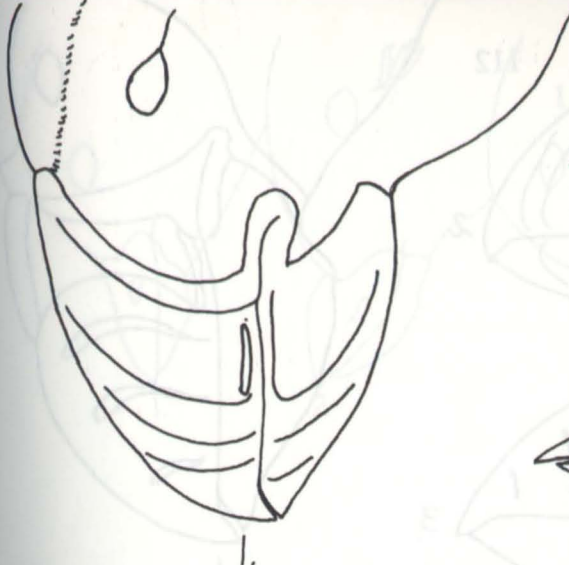


Plate 30

1. Sooty Tern
2. Gull-billed Tern
3. Aleutian Tern
4. Black Tern
5. Least Tern
6. Arctic Tern
7. Common Tern
8. Forster's Tern





1.



2.



3.



4.



5.



6.



7.

Plate 31

1. Horned Puffin, breeding adult
2. Black Guillemot
3. Pigeon Guillemot
4. Common Murre, hatching year
5. Common Murre (*U. aalge californicus*) adult
6. Common Murre (*U. aalge inornata*) adult
7. Thick-billed Murre, adult
8. Thick-billed Murre, young

8.





2.



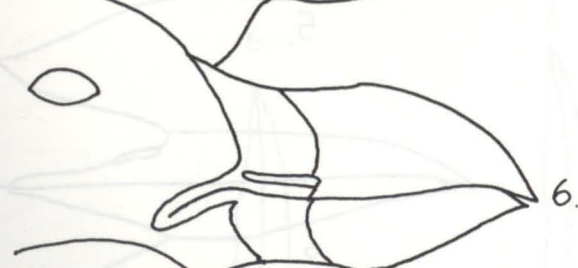
3.



4.



5.



6.



7.



1.

Plate 32

1. Tufted Puffin, breeding adult
2. Horned Puffin, winter adult
3. Tufted Puffin, winter adult
4. Rhinoceros Auklet, winter adult
5. Horned Puffin, young
6. Tufted Puffin, young
7. Rhinoceros Auklet, young
8. Rhinoceros Auklet, breeding adult

8.



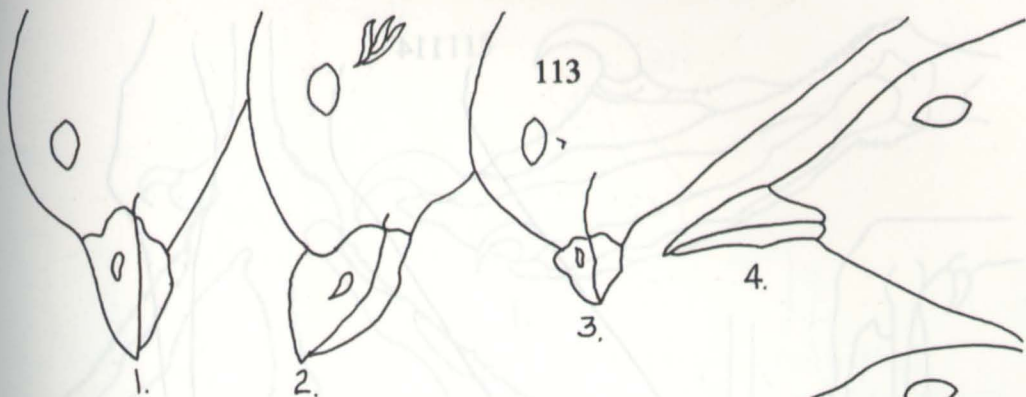


Plate 33

1. Cassin's Auklet
2. Parakeet Auklet
3. Whiskered Auklet
4. Marbled Murrelet
5. Ancient Murrelet
6. Xantus' Murrelet
7. Craveri's Murrelet
8. Kittlitz's Murrelet
9. Common Murre, chick
10. Least Auklet
11. Crested Auklet



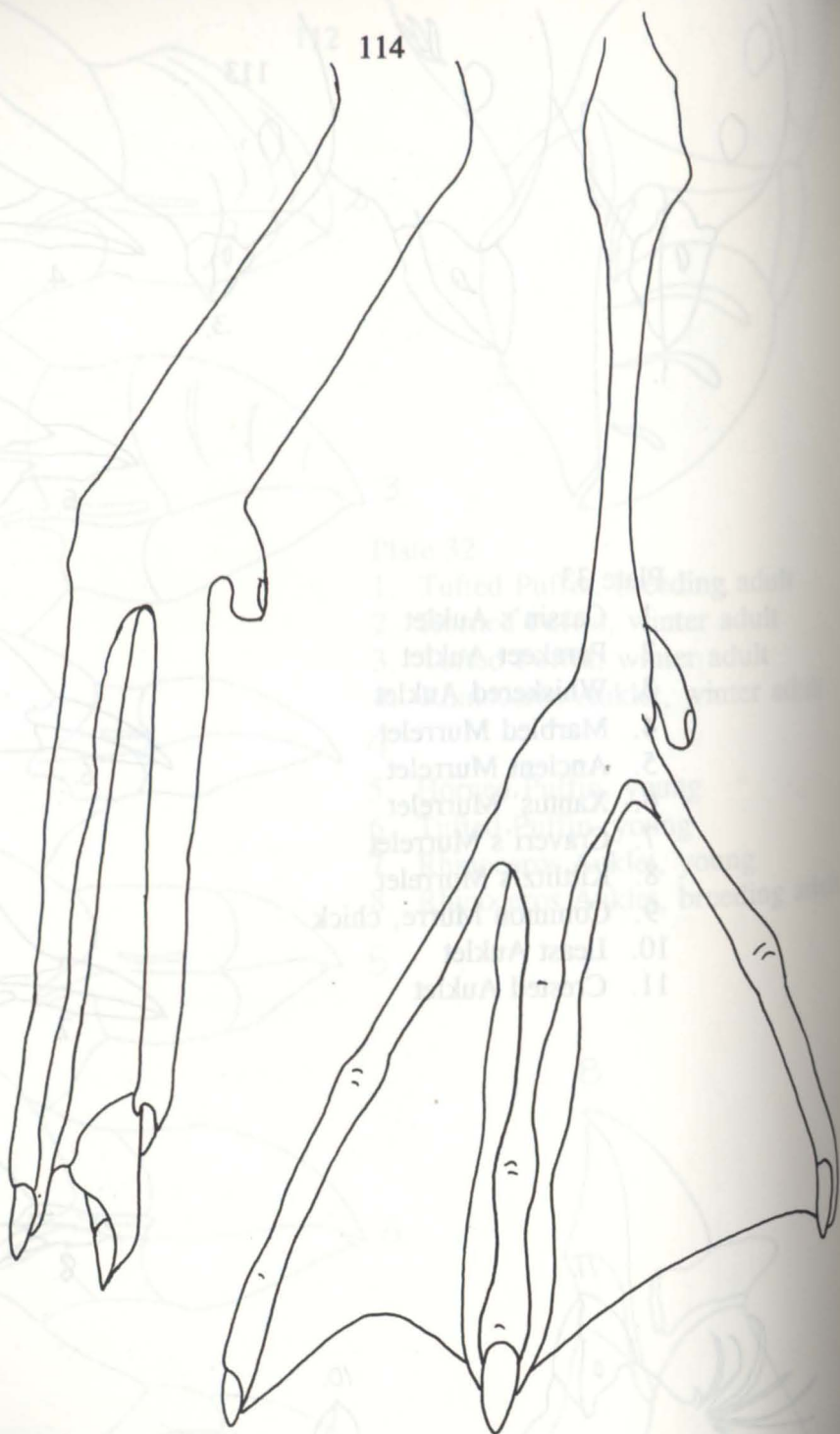


Plate 34. A large and long webbed foot, in this case, a Pacific Loon (right)

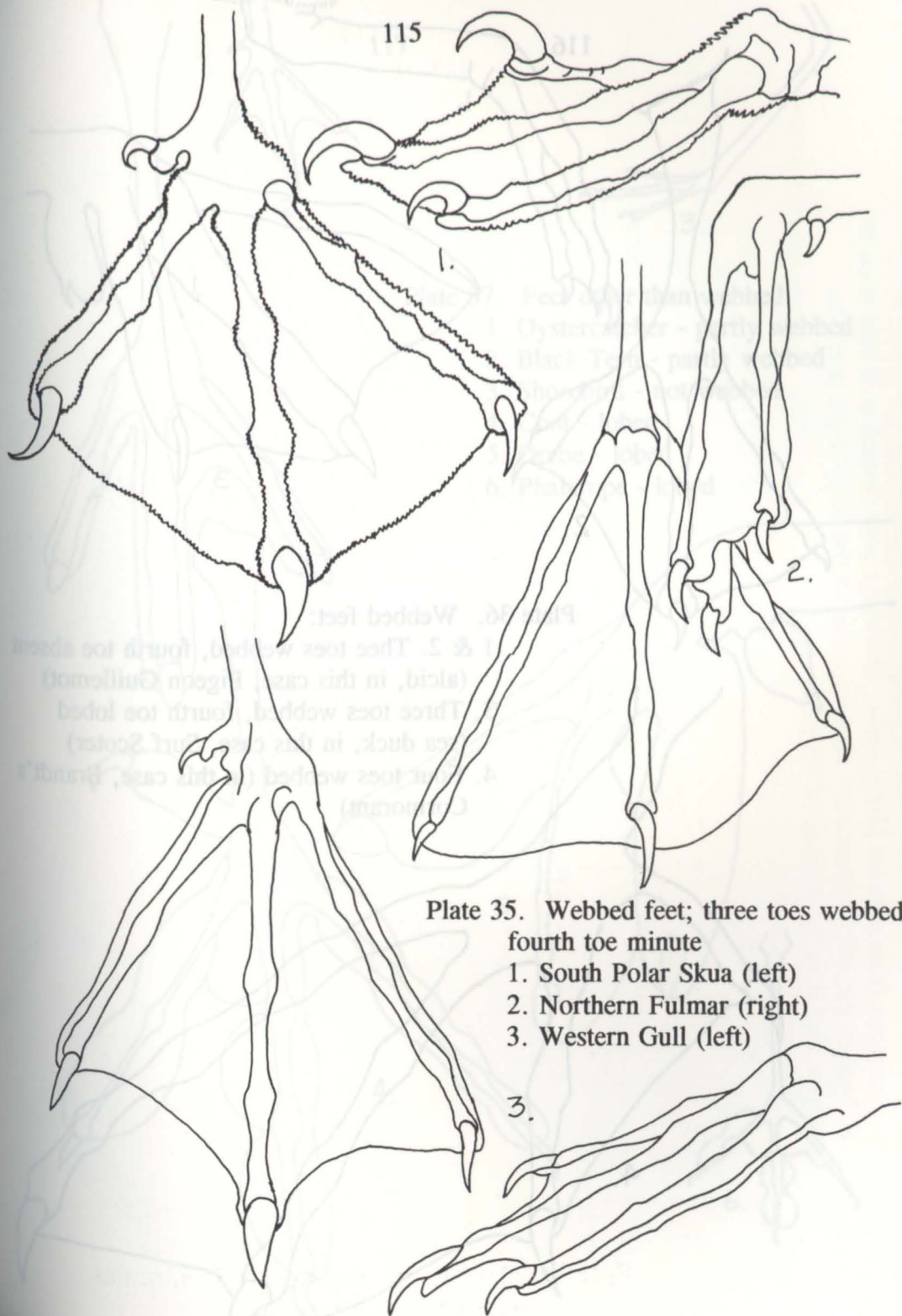


Plate 35. Webbed feet; three toes webbed, fourth toe minute

1. South Polar Skua (left)
2. Northern Fulmar (right)
3. Western Gull (left)

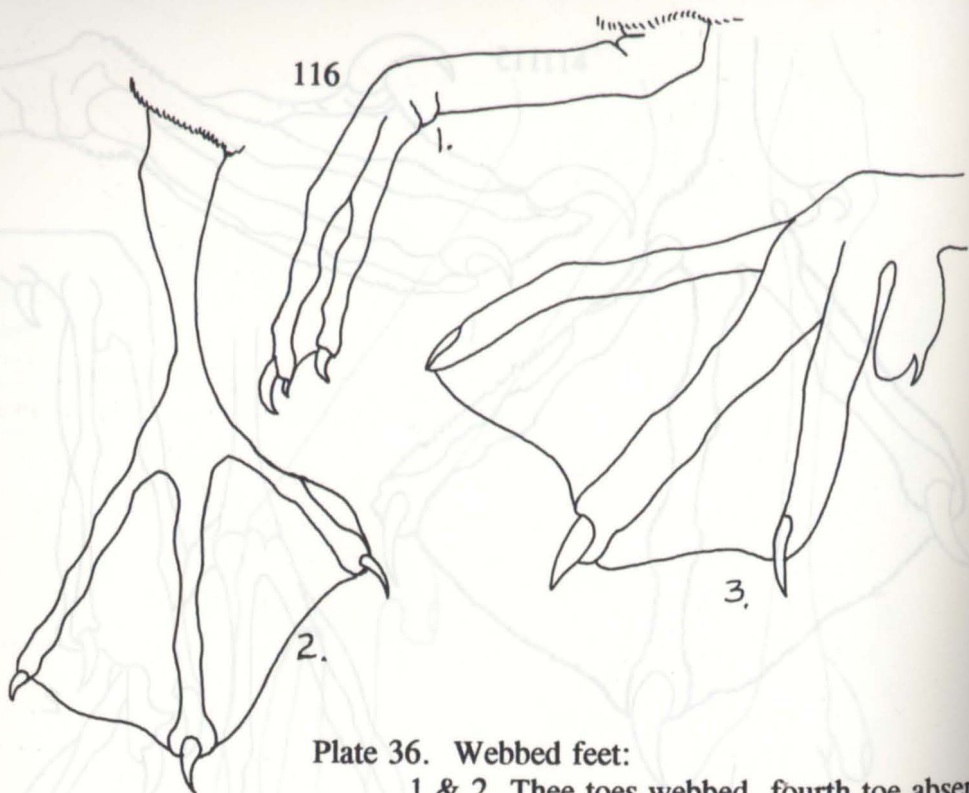
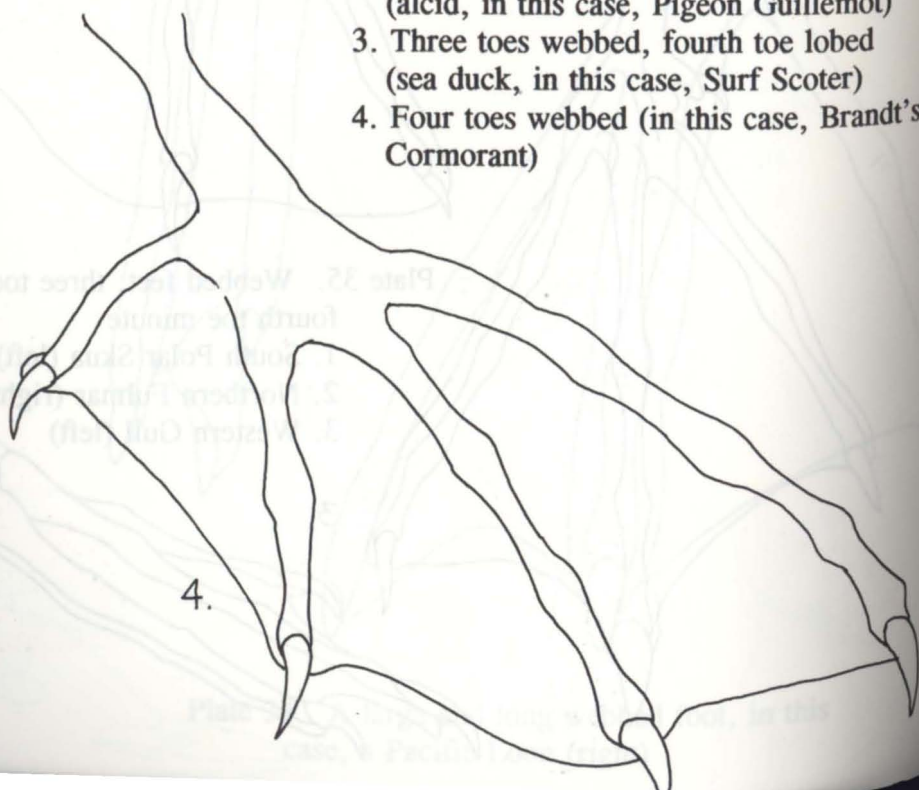


Plate 36. Webbed feet:

- 1 & 2. Three toes webbed, fourth toe absent (alcid, in this case, Pigeon Guillemot)
3. Three toes webbed, fourth toe lobed (sea duck, in this case, Surf Scoter)
4. Four toes webbed (in this case, Brandt's Cormorant)



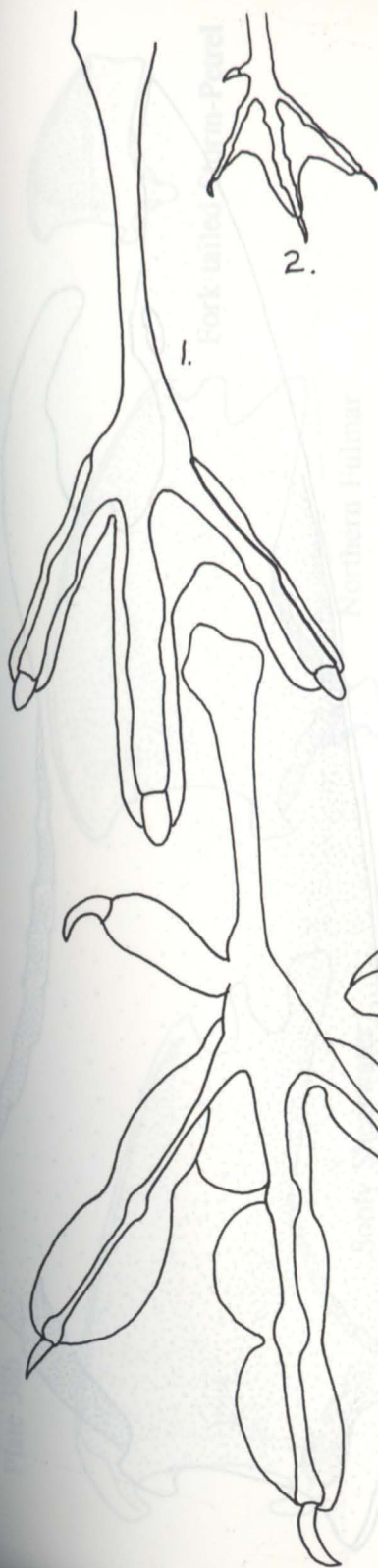


Plate 37. Feet other than webbed:

1. Oystercatcher - partly webbed
2. Black Tern - partly webbed
3. Shorebird - not webbed
4. Coot - lobed
5. Grebe - lobed
6. Phalarope - lobed

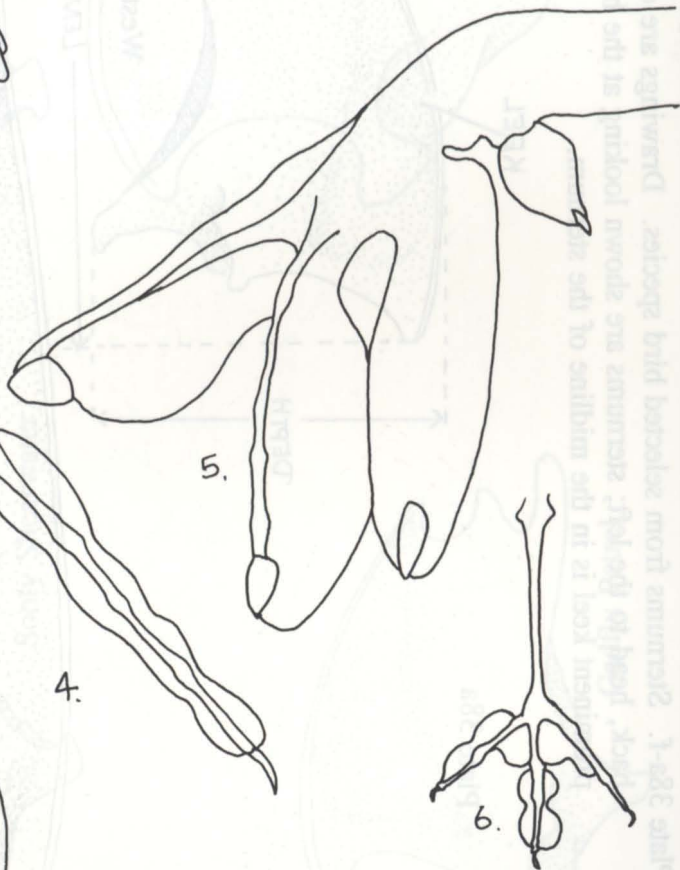
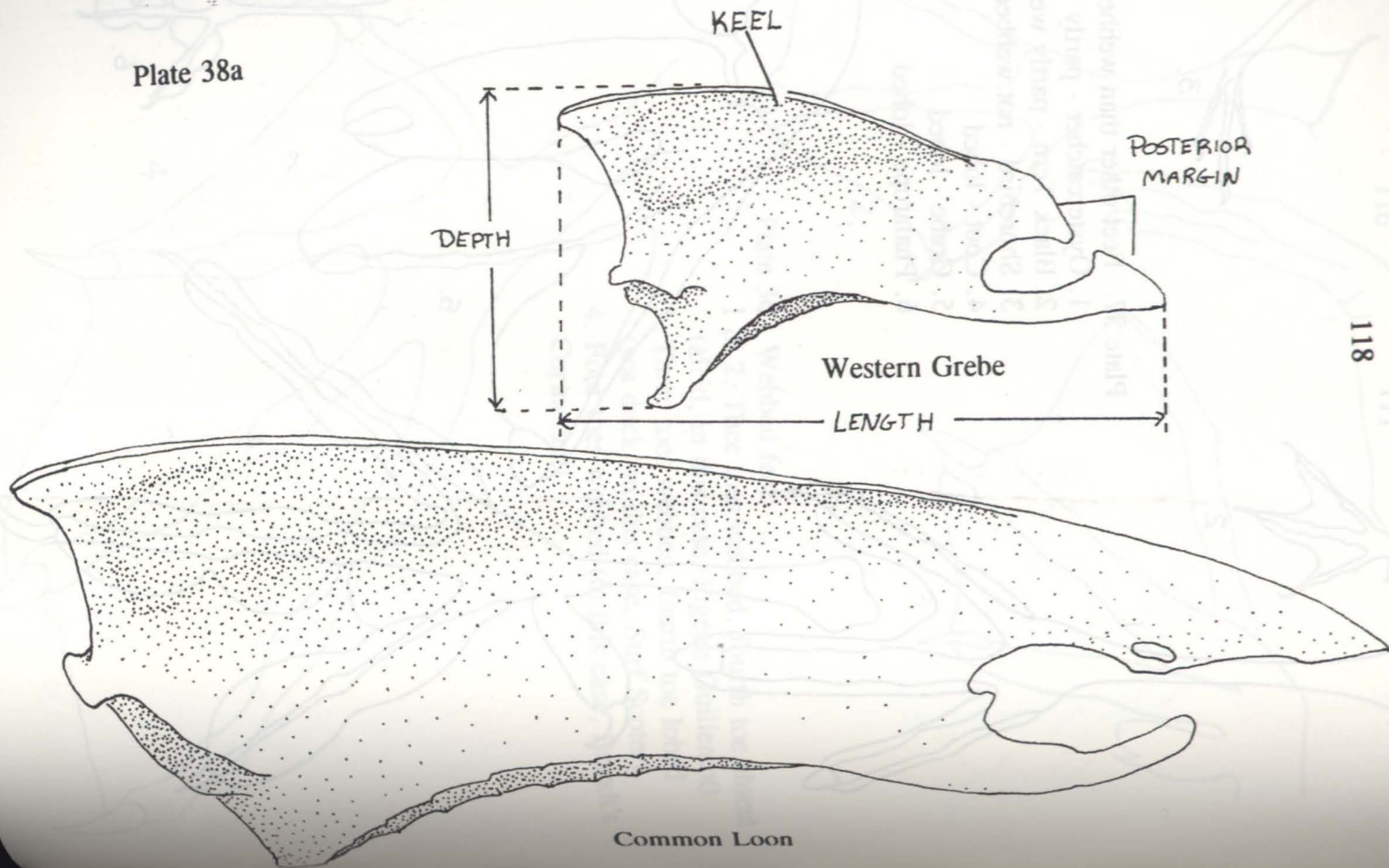
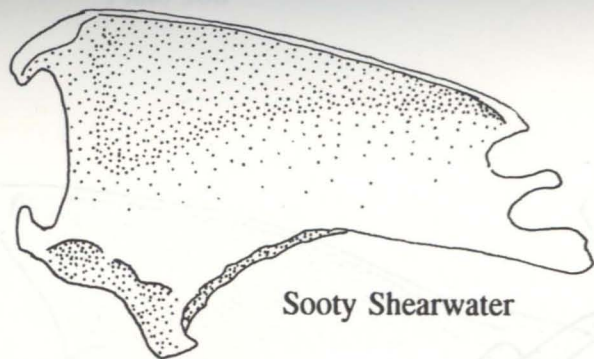


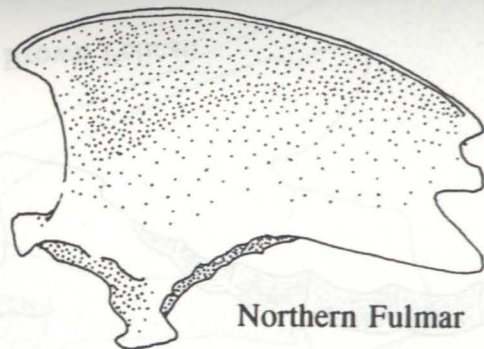
Plate 38a-f. Sternum from selected bird species. Drawings are oriented as if bird is on its back, head to the left; sternums are shown looking at the birds' right side; the prominent keel is in the midline of the sternum.

Plate 38a

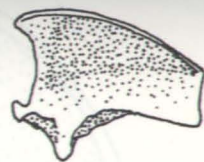




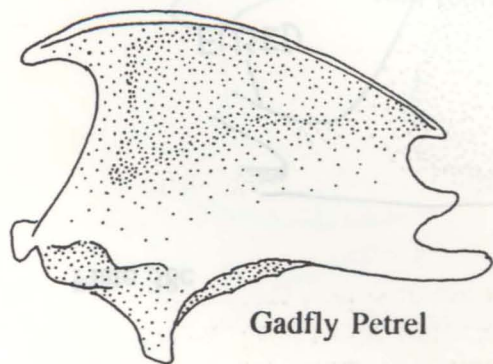
Sooty Shearwater



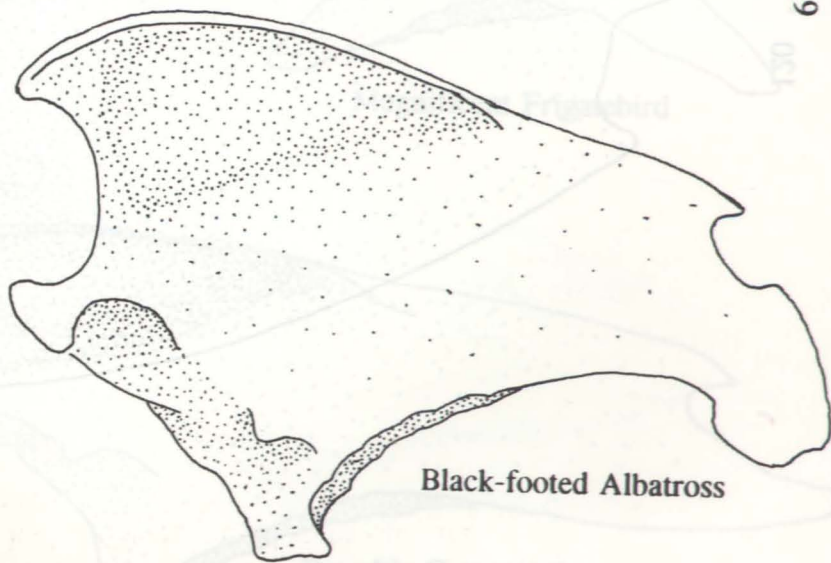
Northern Fulmar



Fork-tailed Storm-Petrel



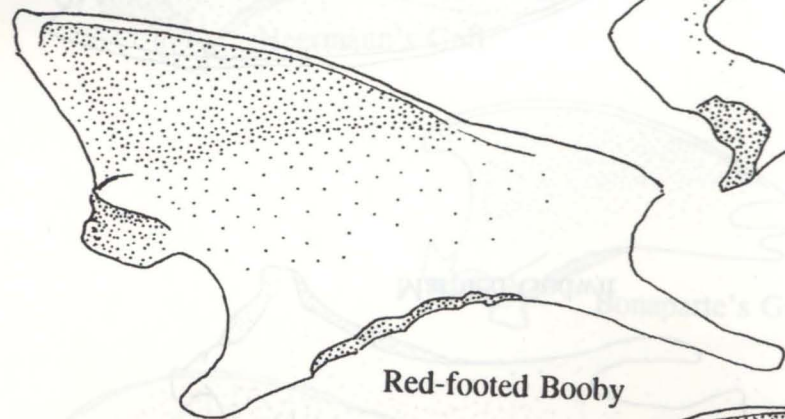
Gadfly Petrel



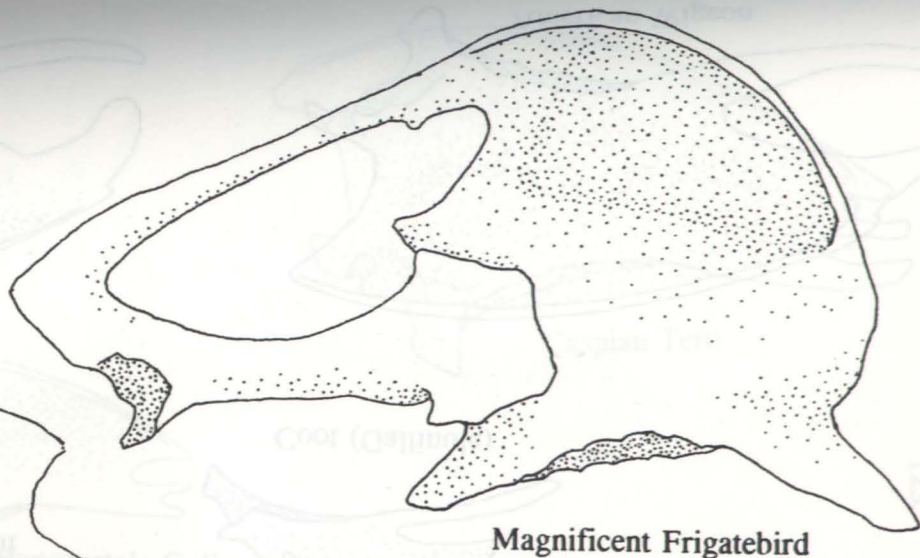
Black-footed Albatross

FUSED

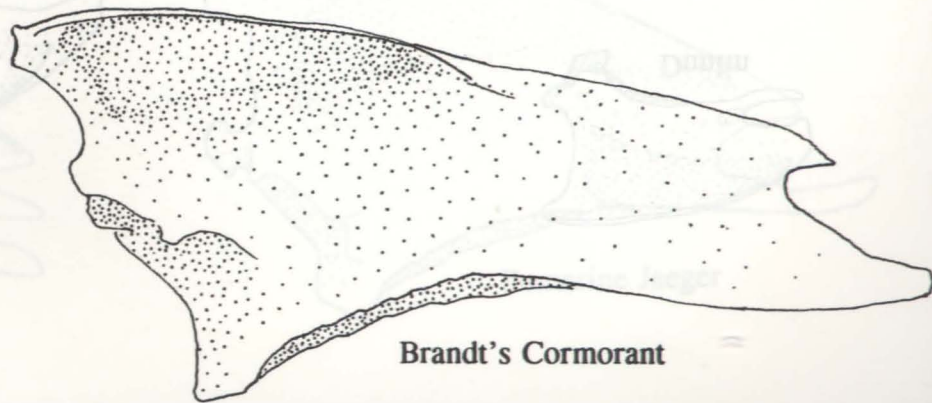
Brown Pelican



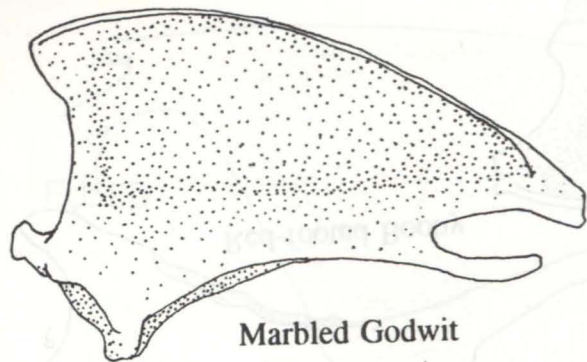
Red-footed Booby



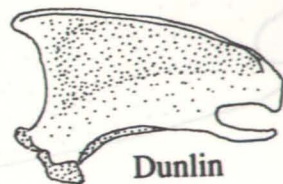
Magnificent Frigatebird



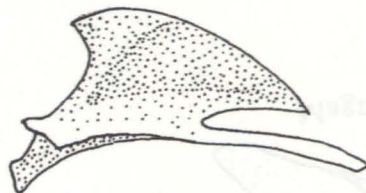
Brandt's Cormorant



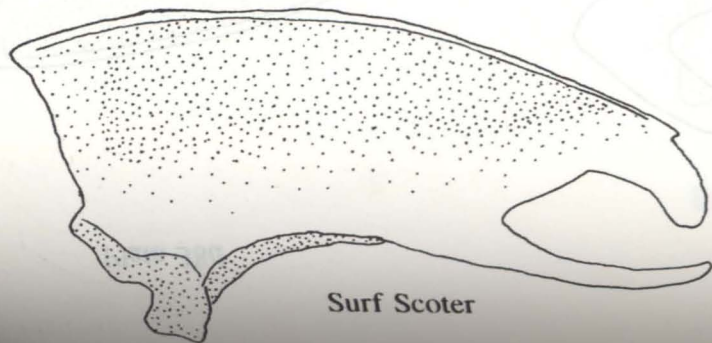
Marbled Godwit



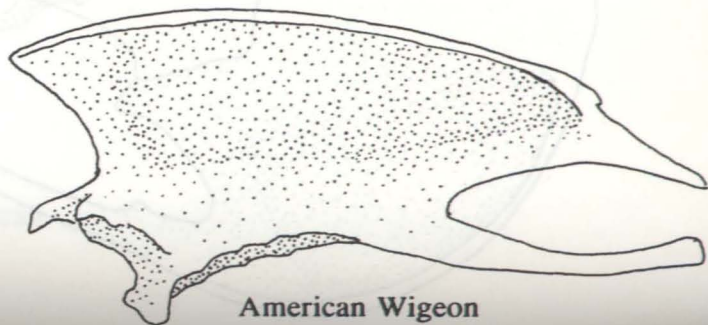
Dunlin



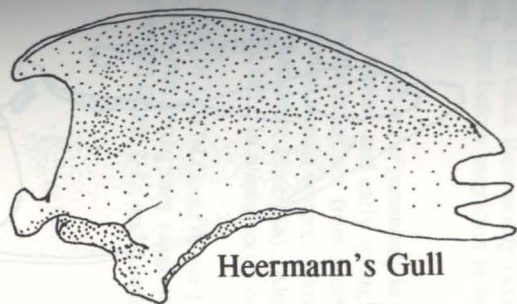
Coot (Gallinule)



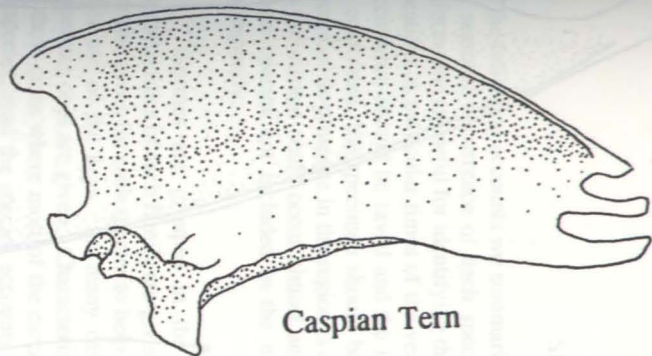
Surf Scoter



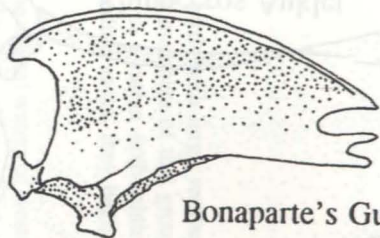
American Wigeon



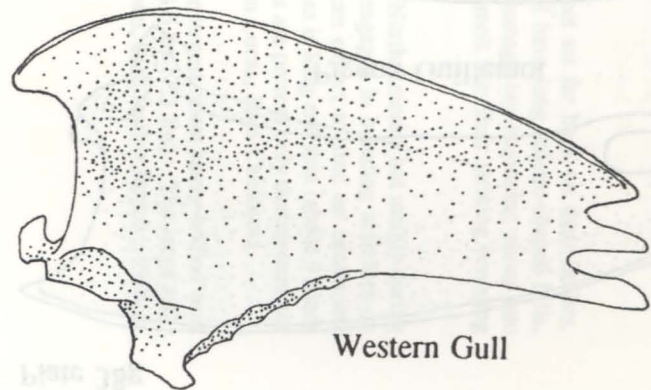
Heermann's Gull



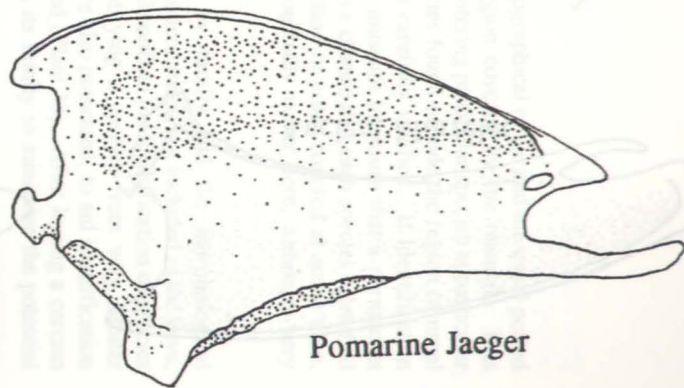
Caspian Tern



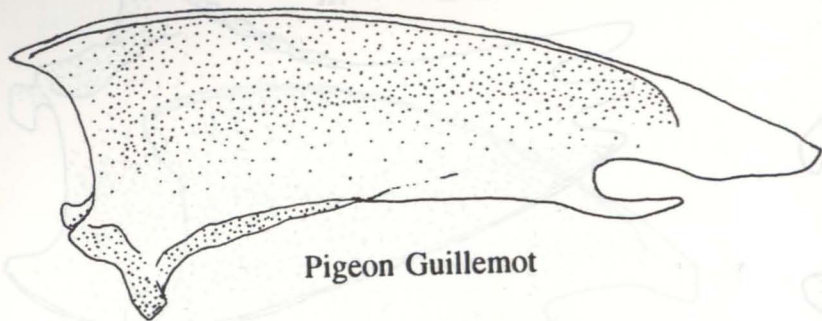
Bonaparte's Gull



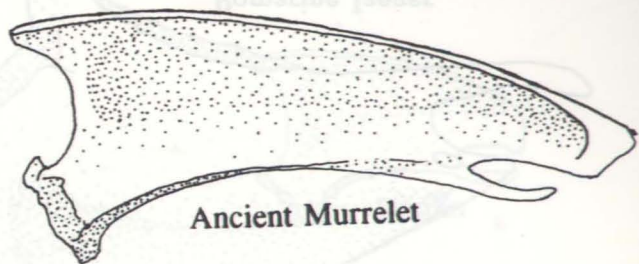
Western Gull



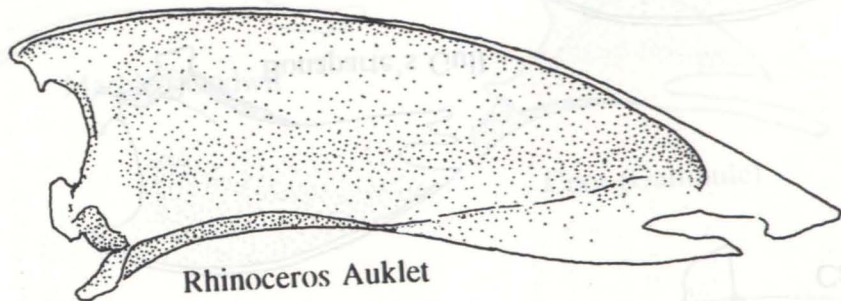
Pomarine Jaeger



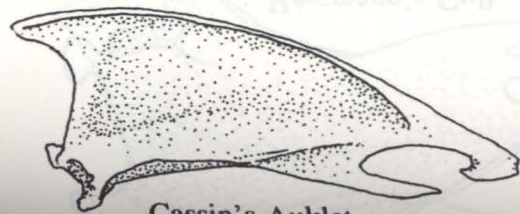
Pigeon Guillemot



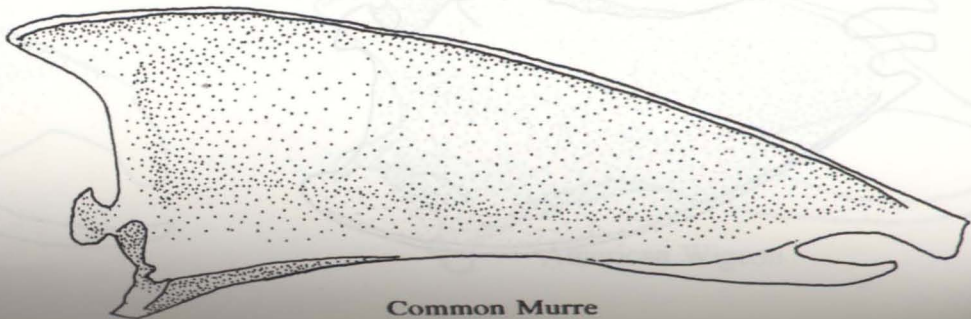
Ancient Murrelet



Rhinoceros Auklet



Cassin's Auklet



Common Murre

SPECIES ACCOUNTS

In the following accounts we summarize information on geographical range and the usual period of seasonal occurrence of each species inhabiting the region covered by the manual. This information is useful for identifying the likelihood of encountering particular species at particular locations at particular times of the year. Carcasses of species found outside the region of usual occurrence should be saved and the identity of the species carefully verified. If identification is confirmed, the specimen should be donated to a major museum to insure that a permanent record of its presence in the region is documented. There is a chance that each species identified in the manual could occur almost anywhere along the section of coast covered at some time. Some species not included in the manual will also undoubtedly occur here, although very infrequently.

Species are grouped in the following accounts by family and the morphological characteristics of each family are given. Morphological characteristics, not included in the keys, are also given for each species to help the user of the manual confirm the identification of species after use of the keys. In many cases, methods of identifying a species from very similar appearing ones are given. Characteristics of the sternum are also presented, to aid identification in those cases where most of the carcass has been scavenged (Plate 38). After keying a carcass to species, read the species accounts for all species within its family to minimize the potential for incorrect identifications.

GAVIIFORMES

LOONS (GAVIIDAE)

Loons are long and heavy-bodied birds with large webbed feet set far back on their bodies. Their tarsi are flat-sided. The five members of this group all have long stiletto-shaped bills. Along the coast they mostly occur in a rather drab winter plumage but beginning about late April, just before migration to breeding areas, they begin to molt into their striking breeding dress.

Loons occur commonly in the coastal waters of western North America but mainly during the fall, winter, and early spring. During summer most are engaged in breeding activities on fresh water lakes but from southeastern Alaska south one can expect to find an occasional individual in coastal waters. Viewed from the side, the sternum is long and thin (about 3 times longer than deep; Plate 38a). Along the Bering Sea coast loons are present only during summer and early fall. In winter loons occur as far south as Cabo San Lucas, Baja California.

COMMON LOON *Gavia immer* (choice 3, pg. 29) is among the largest, most heavy-bodied west coast aquatic birds; they range in weight from 1.6 to 8 kg (3.5 to 17.5 lbs). The large size, heavier bill (Plate 1-1), and coloration of upper parts (dark brown, each feather tipped with light

gray) separate it in winter plumage from Pacific, Arctic and Red-throated Loons. In breeding plumage there should be no problem in separating any of the loons, except perhaps in distinguishing a headless specimen of the Common vs. Yellow-billed Loon (black vs. yellow bill, respectively). Consult any field guide for separating breeding-plumaged loons and the keys in this manual; consult Binford and Remsen (1974) for separating winter-plumaged Common and Yellow-billed Loons.

YELLOW-BILLED LOON *Gavia adamsii* (choice 3', pg. 29) is far less abundant than any of the other loons (except Arctic). One might find an occasional individual along Bering Sea and western Alaskan coasts during late spring or fall and along southeast Alaskan and British Columbian coasts during fall, winter, and early spring. It would be unusual to find one from Washington to central California during the latter period, and even more so farther south; but as they do occur in these regions, the possibility should be considered whenever a very large loon with a light-colored bill is found.

This species is similar in size, color, and shape to the Common Loon, except for the head and especially the bill (see discussion under Common Loon; Plate 1). Do not attempt to distinguish it from the Common Loon if the specimen is headless. Identification should be verified through consultation with a person very knowledgeable in loon identification.

PACIFIC LOON *Gavia pacifica* and **RED-THROATED LOON** *G. stellata* (choices 2 and 2', pg. 29) occur along Bering Sea coasts during summer and from western Alaska south to southern Baja California during fall, winter, and spring. Occasional specimens would be encountered in the latter regions during summer.

Among the larger seabirds, they are nonetheless much smaller than the previous two loon species and range in weight from 1.5 to 2.5 kg. In addition to smaller size, they are distinguishable from the two other loons by their much smaller, thinner bills and different back coloration. In winter plumage the upper parts of a Pacific Loon are largely dark except for pale gray hindnecks and a few scapular feathers, each of which have a pair of white spots. Red-throated Loons are similar except for much paler gray on the back and much more spotting all over. The eye of Red-throated Loon is in the white part of the face; for Pacific and Arctic loons, the eye is in the dark part. **ARCTIC LOON** *Gavia arctica* has occurred rarely in the study region; it can be told in breeding plumage from Pacific Loon on the basis of the color of the throat to its throat -- in Pacific Loon it is green, in the other it is purple.

PODICIPEDIFORMES

GREBES (PODICIPEDIDAE)

Grebes, like the previous group, occur in coastal waters of western North America mainly during the fall, winter and early spring. During the summer, nesting takes place on fresh water lakes.

They are characterized by long necks, streamlined tail-less bodies, very flat tarsi with distinctively lobed toes, white secondaries (except in the largely non-marine Pied-billed Grebe), curved primaries (making the outer wing cupped), and their very tight, compact body feathering. The sternum, viewed from the side, is short and deep (only about one-third again longer than deep; Plate 38a). Only during late spring would specimens in breeding plumage be found in coastal areas.

WESTERN GREBE *Aechmophorus occidentalis* (choices 3-4', pg. 30) and **CLARK'S GREBE** *Aechmophorus clarki* are abundant species occurring from southeast Alaska to southern Baja California during the non-breeding period. A specimen encountered on the coast during summer is not unheard of but is noteworthy. Western is separable from Clark's on the basis of the orange bill and white face of the latter.

The large size and long, stiletto-shaped bill (Plate 2-5,6) distinguishes most specimens from other grebe species. Headless specimens should be separated from Red-necked Grebe with great care. A glaring in-hand difference is in the color of the leading edge of the inner wing, from the wrist to the body, which is white in Red-necked and black in Western and Clark's grebes.

RED-NECKED GREBE *Podiceps grisegena* (choice 2', pg. 30) occurs along most Bering Sea coasts only during summer, is found year round along coasts from the southern Bering Sea to southeast Alaska, and occurs south of there mainly during the fall, winter and early spring but rarely during summer. Individuals found south of central California are worthy of note.

HORNED GREBE *Podiceps auritus* (choice 6, pg. 30) occurs along southern Bering Sea coasts during summer and from western Alaska to northern Baja California during fall, winter, spring and, rarely, during summer.

Tarsus measurements will separate most specimens from those of Eared Grebes. For headless specimens in winter plumage whose tarsi measure 43-45 mm, separation of the two species is virtually impossible.

EARED GREBE *Podiceps nigricollis* (choice 6', pg. 30) is found in coastal waters only rarely during the summer, but otherwise year round from British Columbia to southern Baja California. See discussion of Horned Grebe for further clues on identification.

PIED-BILLED GREBE *Podilymbus podiceps* (choice 5, pg. 30) is not abundant in marine waters, but specimens occasionally occur from British Columbia (perhaps rarely in southeast Alaska) to southern Baja California. They could occur in this region at any time of year. The characteristic shape of the toes, the more extensive webbing between the toes, the difference in white coloration of secondaries, and the tawny color (vs. white in the others) of the neck and breast should distinguish specimens of this species from other grebes of its size.

PROCELLARIIFORMES

ALBATROSSES (DIOMEDEIDAE)

Enormous size in conjunction with very long, narrow wings are characters that should separate an albatross from any other kind of bird one could encounter. Other large birds such as pelicans, frigatebirds, swans and the largest geese all have broad wings. The sternum is short and deep, viewed from the side; deep notches in the posterior margin are lacking (Plate 38b). Using the keys properly, one should have no trouble in identifying the albatross specimens unless one finds a species not represented, a very unlikely but possible event. For this reason, the following accounts discuss only the occurrence of each species.

SHORT-TAILED ALBATROSS *Diomedea albatrus* (choices 2 and 3, pg. 31). It would be truly remarkable to find a specimen now but since the population is recovering slowly from decimation, someday, once again, it could be the most abundant albatross along this coast. If a specimen is found, regardless of its stage of decomposition it should be taken to the nearest major museum. The species could occur at any time of the year in North American waters but perhaps more likely in summer. Its range in the eastern Pacific region used to extend from the Bering Sea to northern Mexico.

BLACK-FOOTED ALBATROSS *Diomedea nigripes* (choices 4 and 4', pg. 31) occurs from the southern Bering Sea to southern Baja California, though not as abundantly south of the California Channel Islands. Specimens could be encountered at any time of year but mostly during summer.

LAYSAN ALBATROSS *Diomedea immutabilis* (choice 2', pg. 31). A specimen found south of Oregon would be worthy of note but the event is very possible. The species occurs along the North American coast mainly from the Aleutian Islands south to Oregon. A small population nests on Guadalupe Island, off the coast of Baja California. The species is most likely to be encountered during fall and spring.

FULMARINE PETRELS (PROCELLARIIDAE)

These birds are characterized by their rather stout, heavy bills that have an intricate series of separate sections (as shown in the Figures of bill shapes). As a person, not too familiar with birds, described to us once in referring to a fulmar, he had found a "sea gull with its bill cracked in several places." The large, single tube enclosing the nostrils on the top of the bill (Plate 5) and the tarsi that are round in cross-section also distinguish fulmarine petrels from similarly-sized and colored shearwaters. The cigar-shaped bodies (including tail) with long, slender wings separate fulmarine petrels and shearwaters from the similarly-sized but plumper, more broad-winged and generally more strikingly colored ducks. The sternum in these and all petrels are similar in shape to that of the albatross (Plate 38b). All petrels, including shearwaters, storm-

petrels, etc., possess such a distinctive odor that once one is familiar with it, one can smell it even on very old carcasses.

NORTHERN FULMAR *Fulmarus glacialis* (choices 12 to 13', pg. 34) is one of the most commonly encountered birds along the entire length of the western North American coast during the winter and early spring. Even during summer and fall, finding an occasional individual is to be expected. They probably occur in ice-free areas of the Bering Sea year round, but otherwise occur there mostly during late spring, summer and fall.

Any specimen possessing a head, because of the bill characteristics (see keys and Plate 5-1), cannot be mistaken for any other species (except maybe the Southern Hemisphere **SOUTHERN FULMAR** *F. glacialisoides*, which is not known to occur in this area). A headless specimen in dark-phase plumage could be confused with one of the dark shearwaters, and one in light-phase plumage could be confused with an adult gull. The latter, however, is not likely if one is aware of the longer less-broadly proportioned wings of the fulmar and the characteristic odor of petrels. On the other hand, distinguishing a dark phase fulmar from a dark shearwater (particularly Sooty Shearwater) does take some experience. A rounded tarsus, and in many specimens, bluish or pale yellow-greenish feet, would identify the bird as a fulmar. Identification should be confirmed with someone experienced in identifying such headless specimens in the hand.

GADFLY PETRELS (PROCELLARIIDAE)

This group of petrels are distinguishable by the stubby, black beak, similar in color and shape to that of storm-petrels (Plate 5); body size, however, is a few times larger than that of storm-petrels. The shape of the sternum is typical of petrels (Plate 38b). Any specimens of this group that are encountered should be saved for a museum.

MOTTLED PETREL *Pterodroma inexpectata* (choice 21, pg. 36). No other petrel, or seabird, that likely would be encountered in the area has the distinctive underwing color pattern of this one (see keys). Mottled Petrels could be found at any time of year. Great numbers are present in summer but for some reason most beach specimens have occurred in winter and spring. The species occurs in small numbers in the Aleutian and southeast Alaska areas and in even smaller numbers as far south as central California along this coast. Any specimens encountered should be saved.

COOK'S PETREL *Pterodroma cookii* (choice 21', pg. 36) is common in offshore waters, but rare inshore, from Baja California to central California during late winter and spring. Only one specimen has been recovered from a beach along this coast. Its completely white underwing linings and belly would distinguish it from the Mottled Petrel.

Even more remote from finding a Cook's Petrel is a **STEJNEGER'S PETREL** *Pterodroma longirostris*, only a few of which have ever been seen in North American waters.

Stejneger's Petrel has a dark gray head (contrasting with the lighter gray of the back); the head and back of Cook's are the same light gray.

MURPHY'S PETREL *Pterodroma ultima* (choice 20, pg. 36). This species is common in offshore waters of this area (Oregon to Southern California) during spring, but is rare in coastal waters. One specimen has been recovered from a beach in Oregon. It's entirely dark plumage (except for the white chin) will separate this species from the other two gadfly petrels. It would be confused mostly easily with the Sooty Shearwater, whose beak is long and thin.

SHEARWATERS (PROCELLARIIDAE)

Except perhaps in the Bering Sea, shearwaters as a group are among the most abundant seabirds, if not the most abundant species, in waters off western North American coasts. Shearwater bodies and wings are quite similar in proportion, size and shape to fulmars. Sometimes, especially in headless specimens, the all dark shearwaters are hard to distinguish from dark phase fulmars (see comments under Northern Fulmar). Otherwise their longer, much more slender bill, much smaller nasal tube which is clearly separated into two passages (Plate 5-6), and flatter-sided tarsi separate shearwaters from any fulmar. The sternum of shearwaters is slightly longer in proportion than in other petrels (Plate 38b). Shearwaters are about the same general size as many ducks and are smaller than the typical sea gull.

Shearwaters are rather conservative in coloration. Except for Buller's Shearwater, those occurring here are dark brown above, and dark brown or white below. Important characters to note are size, color of bill and feet, and color of undertail and underwing coverts.

STREAKED SHEARWATER *Calonectris leucomelas* (choice 17, pg. 35). Only a few records are known for the area, all in central California. The only difficulty in keying out a specimen, with or without a head, would arise when plumage is worn. The color of the undertail coverts and of the inner webs of primaries, and the wing length would then be critical in separating this species from Black-vented, Pink-footed, and Buller's Shearwaters.

PINK-FOOTED SHEARWATER *Puffinus creatopus* (choice 17', pg. 35). The light-colored feet and bill and dark undertail coverts, in conjunction with the dark upper parts and white breast and belly would separate a specimen of this species from any other that could be encountered except the much smaller Black-vented Shearwater. Pink-footed Shearwaters occur here mostly during summer and early fall but specimens have been found during the winter. They are most abundant south of central California but have been reported as far north as southeast Alaska, where they occur regularly but in small numbers.

FLESH-FOOTED SHEARWATER *Puffinus carneipes* (choice 18', pg. 35) is identical to the Pink-footed Shearwater except for its completely dark underparts. Its occurrence patterns are also the same except that it is far less numerous. Any specimen encountered should be saved.

BULLER'S SHEARWATER *Puffinus bulleri* (choice 15, pg. 35) is the only strikingly-colored shearwater off this coast. It is white below and pearl gray above except for a black cap and a black W across its wings and back. In specimens of very worn plumage, it is very similar to the Streaked Shearwater. The fact that the inner webs of primaries are extensively white in Buller's Shearwater would separate such specimens from the latter in which the inner webs are dark.

During the late summer and early fall of some years, Buller's Shearwaters are common in coastal waters from central California north to British Columbia. Rarely they occur north or south of there. Any specimens from the Aleutians, Bering Sea or Baja California should certainly be saved for verification. On rare occasions this species has occurred in west coast waters during the winter.

SOOTY SHEARWATER *Puffinus griseus* (choice 19, pg. 35) is distinguishable from other all dark shearwaters mainly on the basis of size. It is smaller than the Flesh-footed and larger than most Short-tailed Shearwaters. The light coloration to feet and bill in the first and the generally darker wing linings in the second are additional clues for separating these, respectively, from Sooty Shearwaters.

During most summers and early falls, the Sooty Shearwater ranks among the most abundant birds occurring in coastal waters of western North America, especially from southeast Alaska southward. They occur at other times of the year in low numbers but when any dark shearwater is found among the Aleutians or in the Bering Sea at any time or elsewhere during winter and early spring, the Short-tailed Shearwater should be strongly considered.

SHORT-TAILED SHEARWATER *Puffinus tenuirostris* (choice 19, pg. 35) is a smaller, more delicately proportioned version of the preceding species. It is abundant in the Bering Sea and in the vicinity of the Aleutian Islands during summer and fall; its numbers drop off rapidly to the south but it has occurred as far south as Baja California. South of Washington they are rather uncommon, and specimens south of central California should be saved for verification. It is more likely that dark shearwaters encountered along the west coast after November are this species rather than the Sooty Shearwater.

MANX SHEARWATER *Puffinus* spp. (choice 16, pg. 35). The small size of individuals in this species group should distinguish them from other white-bellied shearwaters occurring off the North American west coast. It occurs in four forms in the eastern Pacific.

BLACK-VENTED SHEARWATER *P. opisthomelas* is the most common here. The dusky sides, vent and throat should distinguish it from the forms discussed below. Black-vented Shearwater occurs regularly in Baja California and southern California coastal waters year round. During fall and in winter it has occurred regularly but in small numbers north to central California. One should expect the occasional specimen as far north as southeast Alaska, but north of central California specimens should be saved for verification.

Among other forms, all have clear white undersides, except for the undertail coverts, which are entirely white only in the MANX *P. p. puffinus*. The undertail coverts in TOWNSEND'S SHEARWATER *P. auricularis townsendi* are dark in almost all individuals. NEWELL'S SHEARWATER *P. a. newelli*, and a few Townsend's, have undertail coverts that are white anteriorly and dark towards the tail tip. The following measurements (in mm) were taken from Murphy (1952), Jehl (1982) and Bourne et al. (1988):

	Townsend's	Newell's	Manx	Black-vented
Wing chord	220-238	223-249	221-243	214-251
Tarsus	42-47	43-48	43-49	43-56
Exposed culmen	28-35	30-36	32-37	34-42

The marine distribution of the Townsend's Shearwater is only recently becoming known, but still much remains to be determined. Probably it does not often occur far north along the Baja California coast (but two individuals have been reported from central California). Newell's Shearwater frequents oceanic waters east of Hawaii, where it nests; it has yet to be reported in coastal waters of North America. The Manx Shearwater has been reported on several occasions in these waters. Whenever any specimen of the Manx Shearwater is found it should be saved. The Townsend's and Newell's are listed as threatened and endangered, respectively, on the Endangered Species List.

STORM-PETRELS (HYDROBATIDAE)

This group includes the smallest seabird. Some are as small as sparrows and others no larger than robins. Except for one species, all are dark brown or gray with or without white rump feathers. If only a wing is found, identification will be difficult and should be confirmed by someone very familiar with these birds. For that matter, even the identification of entire specimens would best be confirmed by an experienced person. See Plate 38b for a view of the sternum.

FORK-TAILED STORM-PETREL *Oceanodroma furcata* (choice 2, pg. 31). Because these birds are pearl gray they cannot be confused with other species of storm-petrels occurring off the coast. North of central California, and into the Bering Sea, they should be expected at any time of year in ice-free areas. South of this region they are more likely to occur during winter but only on rare occasions.

LEACH'S STORM-PETREL *Oceanodroma leucorhoa* (choice 7, pg. 32, and 8', pg. 34). This species' size and the dark central feathers in its otherwise white rump should distinguish it from other white-rumped species. Unlike other storm-petrels, however, from central California south, the rump color of Leach's Storm-petrel varies tremendously from totally white to totally dark.

The greatest difficulty will be in distinguishing dark-rumped Leach's from other dark-rumped species (see Ashy Storm-petrel). Careful consideration of characters mentioned in the key should suffice in most cases.

North of central California this and the previous species are the only storm-petrels that one should expect to encounter. Leach's Storm-petrels rarely occur in the Bering Sea even though they breed on many of the Aleutian Islands. From central California north one should find them only during the spring, summer, and early fall. To the south, they could be encountered year round.

BLACK STORM-PETREL *Oceanodroma melania* (choice 3, pg. 31) is the largest of the all-dark storm-petrels off this coast and size alone should distinguish it from any of the others. It occurs in southern and Baja California waters mainly from spring to fall although winter occurrences would not be unusual. North to central California they occur quite regularly during late summer and fall. From there north, specimens should be saved for verification.

ASHY STORM-PETREL *Oceanodroma homochroa* (choice 9', pg. 34) is the all-dark species most similar to the all-dark Leach's Storm-petrel. The fact that it is ashy gray (especially at tips of tertials and secondary coverts), fading in the late summer to brown, should separate it from Leach's, which is dark chocolate brown and fades to lighter brown. The underwing coverts are the best to check for these color differences, since fading occurs there only slightly. The buffy bar running through the upper wing coverts is much more prominent in Leach's Storm-petrel. Experience in distinguishing these two birds in the hand helps a great deal since it is not necessarily an easy undertaking.

Ashy Storm-petrels occur year round from northern Baja California to central California, and in the fall sometimes occur in northern California waters.

BAND-RUMPED (or HARCOURT'S) STORM-PETREL *Oceanodroma castro* (choice 7', pg. 32) has been reported in this region only at sea off southern Baja California. The white base of tail feathers should separate any specimen from other white-rumped species.

LEAST STORM-PETREL *Oceanodroma microsoma* (choice 9, pg. 34). The extremely small size should separate any specimen of this species from any of the other all-dark storm-petrels. The square or even rounded tail is also distinctive. Least Storm-petrels occur quite commonly from Baja California north to southern California. They have been reported as far north as northern California. Off Baja they occur during the spring to fall period, but north of there, occurrence is pretty much restricted to the fall.

WEDGE-RUMPED (or GALAPAGOS) STORM-PETREL *Oceanodroma tethys* (choice 6, pg. 32), is a very small white-rumped species that is most easily confused with small, white-rumped Leach's Storm-petrels from Guadalupe Island, off the central Baja California coast. The size of the rump patch relative to the tail length, as described in the keys, should be checked carefully. When checking tail length be sure to note whether feathers are still growing. On only a few

occasions has this species been reported in waters off this coast and never north of central California. All specimens should be saved for verification.

WILSON'S STORM-PETREL *Oceanites oceanicus* (choice 5, pg. 32). The very long tarsi, yellow-webbed large feet, and white lower belly (including lateral and undertail coverts), as well as the white rump, are characteristics of this species that collectively should set it apart from any others. This visitor from the Southern Hemisphere occurs regularly but in extremely small numbers in west coast waters, mainly during the fall. It has been reported at least as far north as Washington. Any specimen should be saved for verification.

PELECANIFORMES

TROPICBIRDS (PHAETHONTIDAE)

RED-BILLED TROPICBIRD *Phaethon aethereus* (choice 13, pg. 26). About the size of a Western Gull, these birds are largely white all over except for fine, black barring on upper parts. Primary wing coverts are black, as is the upper surface of the outer 5 primaries. The bill is very heavy but similar in shape to that of a Caspian Tern (compare Plates 4-2 and 29-1). In adults the bill is scarlet but in juveniles it is yellow. The feet are black.

Red-billed Tropicbirds are quite rare in these waters. They are most likely to be found from San Diego south although individuals have been reported as far north as Washington. They are most likely to appear between May and October. Rarer still in the area covered by this guide are two other tropicbird species. Consult field guides for differences (e.g. Harrison 1985).

PELICANS (PELECANIDAE)

There are few marine birds larger than pelicans. The large, uniquely shaped bill and the fact that all four toes are joined by webs (Plate 36-4), in conjunction with the huge body should distinguish most specimens. The sternum is also distinctive -- it and the furculum (wish bone) are fused (Plate 38c). The Great Blue Heron, an aquatic bird of similar size, is bluish-gray in color and has a very long, thin neck and legs; an albatross has much longer and thinner wings (compared to the pelican's very broad wings) as well as only three of its toes joined by webs. The largest Canada Goose, if headless and footless, would be the most similar and would have to be distinguished on the basis of color pattern. The pelican would not have a black neck and tail.

AMERICAN WHITE PELICAN *Pelecanus erythrorhynchos* (choice 8, pg. 22) is entirely white except for black primaries. Feet and bill are yellowish-green (except during breeding season). They are present along the coast from northern California south only from May through March. The remainder of the year they spend at inland nesting areas.

BROWN PELICAN *Pelecanus occidentalis* (choices 9 and 9', pg. 22) is mostly brown, except that immatures have white bellies and adults have a good deal of white on the head and neck. The bill is mostly brown (intensifying to reddish during breeding) and the feet blackish. Brown Pelicans occur from British Columbia south during the period from June into October, and occur year round in the area from southern California south. During some years they may occur year round in low numbers as far north as northern California. This species is currently listed as endangered, but it may be de-listed soon (or changed to Threatened), on the Endangered Species List.

BOOBIES (SULIDAE)

Boobies are relatively large seabirds about the size of loons (but not as heavy) and the largest gulls. They have long, wedge-shaped tails, and all four toes are connected by webs (Plate 36-4). The middle toenail is flared to the side and finely cut. It appears much like a curved hair comb (Fig. 17). The bill is stout and sharply pointed with serrated, sharp edges (Plate 8). The sternum possesses a prominent, forward-projecting and triangular keel (when viewed from the side; Plate 38d). If the keys are followed closely, there should be little problem in separating the four species in this group.

MASKED (or BLUE-FACED) BOOBY *Sula dactylatra* (choices 5' and 7, pg. 37) could be encountered on rare occasions from central California south.

BLUE-FOOTED BOOBY *Sula nebouxii* (choice 6, pg. 37) is the most likely booby to be found in the area but even so it is quite rare. Specimens have been encountered as far north as Washington, but any found north of central Baja California should certainly be saved for verification. They have occurred north of there only during late summer and fall.

BROWN BOOBY *Sula leucogaster* (choices 3, 3', 8 and 9, pp. 36-37) is one of the more likely boobies to occur in the area. To find one north of southern California would be remarkable and any specimens north of central Baja California should be saved. In their area of occurrence, records exist for all seasons of the year.

RED-FOOTED BOOBY *Sula sula* (choices 5, 7' and 9', pp. 36-37) can be quite variable in color, from mostly white to mostly brown. Only a few individuals have ever been observed in this area, all during fall in central California.

CORMORANTS (PHALACROCORACIDAE)

Cormorants are relatively large seabirds about the size of the smallest loons and the largest gulls. They are heavy for their size. In their first year they are generally brownish all over but by their

third year they are black with a bluish, purplish or greenish sheen. As with other Pelecaniformes the four toes on each foot are all joined by webs (Plate 36-4). They have very long, fan- or wedge-shaped tails. The sternum is much longer, relative to its depth, than in other Pelecaniformes, and is more similar to other diving species (Plate 38d).

DOUBLE-CRESTED CORMORANT *Phalacrocorax auritus* (choices 3 and 6, pg. 38) is the largest cormorant on the Pacific coast. It is all too often confused with the Brandt's Cormorant, which is almost as large. If there is no yellow on the bill or gular pouch, it is not a Double-crested Cormorant. People often see the light buffy chin coloration on Brandt's Cormorant specimens and misidentify them. The back feathers of a Double-crested Cormorant have a bronze sheen and are edged with black giving a scaled appearance. All other cormorants show an even greenish or purplish sheen. In addition, the back and dorsal wing feathers are more blunt than the pointed ones of Brandt's Cormorant.

Double-crested Cormorants are very local in occurrence. They occur year round from the Alaska Peninsula to Cabo San Lucas. From southern Washington to northern Baja California they are rather uncommon compared to other cormorants.

BRANDT'S CORMORANT *Phalacrocorax penicillatus* (choices 4 and 7, pg. 38). Characteristics of this species are discussed above. From Washington to northern Baja California it is by far the most abundant cormorant; the majority of cormorant specimens encountered will be this species. It occurs from southeast Alaska to Cabo San Lucas, and is present year round throughout this range. From British Columbia north its abundance declines rapidly. North of Vancouver Island specimens should be retained for verification.

PELAGIC CORMORANT *Phalacrocorax pelagicus* (choice 4' and 7', pg. 38) is the smallest cormorant species and is rather more delicate than others in some of its proportions. It is most similar to the Red-faced Cormorant. These two species have white feathers on their flanks only early during the nesting season.

Pelagic Cormorants occur from the Bering Sea to northern Baja California. Except where sea ice forms in the northern Bering Sea, they are present in these areas the year round.

RED-FACED CORMORANT *Phalacrocorax urile* (choice 3' and 6', pg. 38) is most difficult to separate from the Pelagic Cormorant. No more information can be added except what is contained in the keys. If the specimen is headless, identification should be verified by someone experienced in separating the two species in the hand. The dorsal wing surface of Red-faced Cormorant is dull brown, contrasting the iridescent body; in Pelagic Cormorant these parts are of the same color (iridescent).

Red-faced Cormorants occur mainly in the Bering Sea and among the Aleutian Islands. They also nest on islands off the south coast of the Alaska Peninsula. They are present in these areas year round except where sea ice occurs in winter.

FRIGATEBIRDS (FREGATIDAE)

MAGNIFICENT FRIGATEBIRD *Fregata magnificens* (choices 3-4', pg. 22) is one of the largest marine birds that occurs along the Pacific coast but its very light weight is truly remarkable. The frigatebird's bill is long with a very large, sharp hook at the end (Plate 4-l). Except for the white breast of females and the white head, throat and breast of immature birds, their feathers are entirely black. As on pelicans, the sternum and furculum are fused; the sternum is among the shortest (relative to depth) of any seabird (Plate 38d), and quite small relative to the large wings. Almost all frigatebirds that occur in this area are immatures.

Frigatebirds occur year round from central Baja California south and quite regularly but in very low numbers during the summer and fall as far north as southern California. They occur north of there, and very rarely as far as Oregon, only during years when waters are unusually warm. A few GREATER FRIGATEBIRDS *Fregata minor*, which are actually smaller than Magnificent Frigatebirds (but which have a very light bar across the shoulder of the wing) have been seen in California. All specimens of frigatebirds should be saved for verification.

ANSERIFORMES

Other than the sea ducks and Brant, waterfowl occur infrequently on West Coast beaches. On beaches near to the out-flow of large river systems, such as the Gulf of the Farallones or near the mouth of the Columbia River, one is likely to find a number of these species, which have washed by the river flow to the coastal areas.

SWANS AND GEESE (ANATIDAE)

TUNDRA SWAN *Cygnus columbianus* (choice 3, pg. 39) and TRUMPETER SWAN *Cygnus buccinator* (choice 3', pg. 39) are VERY large, long necked, white-bodied (juveniles may be washed with gray), dark-legged birds. Care should be taken separating Tundra from Trumpeter Swans; the important differences are given in the key. Tundra Swans occur between April and September at breeding sites on the western Alaskan coast. During the remainder of the year they may occur at coastal sites from the Aleutian Islands to Morro Bay, California, although most winter between Puget Sound and San Francisco Bay. Trumpeter Swans breed at a few coastal locations in southern Alaska and winter from the Alaska Peninsula south to the Columbia River mouth in northern Oregon.

CANADA GOOSE *Branta canadensis* (choice 7, pg. 40) varies in color and size depending on the race. Individuals of some races are almost duck-sized; others are much larger. This range in size can be seen in the bill, as well as other parts (Plate 12b-1,2). Canada Geese are basically dark, distinguished by a white chin, white V-bar on the rump and white undertail coverts. Legs, feet and bill are black. Canada Geese breed in coastal areas from western Alaska to Vancouver Island, British Columbia. By late December most have reached wintering areas, which on the coast extend from Vancouver Island to Mexico.

BRANT *Branta bernicla* (choice 7', pg. 40) are the most marine of the west coast geese. They are slightly larger than a Mallard in size. A vertically barred, white neck collar, white sides and white undertail coverts contrasts with their otherwise dark plumage. The bill, feet and legs are black. Brant reach their western Alaskan breeding grounds in May and remain until August. They winter from southern Alaska to Baja California from October to April or May. Stragglers have been found in the winter range in June or July.

EMPEROR GOOSE *Chen canagica* (choice 9, pg. 40) is a large, primarily gray bird. It is the only goose on the west coast with dark undertail coverts and an all-white tail. The head and neck of adults are white, legs are orange and bill is pink. Bill, head, neck and legs are dark in the immature. Emperor Geese breed along the coast of western Alaska and winter primarily on the Aleutian Islands. Rarely, small numbers winter as far south as California.

GREATER WHITE-FRONTED GOOSE *Anser albifrons* (choice 9', pg. 40) is a large, brown bird with a white lower belly and undertail coverts, and a white crescent on the rump. Adults have white on the face, pink bills and orange legs. Immatures lack the white face and have yellow bills and legs. Adults have conspicuous dark patches on the belly. White-fronts occur in breeding areas on the coast in western Alaska from about mid-April until August. Most White-fronts winter at inland locations but they occur along the coast between Alaska and California during migrations.

SNOW GOOSE *Chen caerulescens* (white phase, choice 4, pg. 39; blue phase, choice 8, pg. 40) and ROSS' GOOSE *Chen rossii* (choice 4, pg. 39). The white phase of the Snow Goose and the Ross' Goose are whitish birds with black wing tips (black primaries). Juveniles of both species are washed with drab gray and have dark bills whereas adults lack the gray wash and have pink bills. Adult Ross' Geese may have warty protuberances on the upper bill. Adult Snow Geese have black lip marks. The Blue Goose, a color phase of the Snow Goose, is dark bodied and white headed. Blue and Ross' Geese are rare on the west coast. The white phase of the Snow Goose occurs on the coast during migrations and during the winter at some coastal locations between San Francisco Bay and southern British Columbia.

DUCKS (ANATIDAE)

Many species of ducks in male eclipse (worn for a short period after breeding), female, and juvenile plumages are similar in appearance; their body feathering is patterned with various shades of brown, gray and buff and black and white. Individuals in these plumages are best identified to species by size, head and bill shape, and the color pattern of the wing. In almost all cases males in breeding plumage are very distinctive and can readily be identified from the color patterns of the body plumage. The book by Bellrose (1976) has plates showing the wing patterns of all species. Determining the sex of many species in the late summer and early fall may be difficult since adult males in eclipse plumage and females and juveniles may all be drab in color and similar in appearance. Sexing and aging some species during this period may be done from wing characteristics as described in Carney (1964). The sternum of ducks is long, relative to depth, as in diving species of seabirds; the posterior margin is deeply incised (Plate 38e)

MALLARD *Anas platyrhynchos* (choice 54 and 54', pg. 46) is identified by a violet-blue speculum bordered fore and aft by a white stripe. The wing of the female Steller's Eider is generally similar except that the blue coloration extends well into the tertials whereas it does not in the Mallard. Mallard bills are yellow to orange and black; their legs are orange. Domestic ducks have been bred from the Mallard stock. They vary considerably in coloration; the extreme is pure white. Be on the lookout for these birds. Mallards breed near the coast from western Alaska to California; they winter from western Alaska south.

GADWALL *Anas strepera* (choices 47 and 47', pg. 45). The male in breeding plumage is brown headed, gray and brown backed and black rumped. The bill is blackish, the legs are orange. In other plumages the species is best identified from the wing characteristics described in the key. Except for the wing, female Gadwalls and Mallards are similar. The Gadwall's bill is distinctly smaller than the Mallard's (Plate 13). Gadwalls occur along the coast from British Columbia south, except during summer.

GREEN-WINGED TEAL *Anas crecca* (choices 58 and 58', pg. 46) is the smallest duck, its wing pattern and bill (Plate 13) distinguishes it from Cinnamon and Blue-winged Teals in all plumages. Green-wings breed from northern Alaska to central California, although from British Columbia south they are primarily inland. The winter range extends from Southern Alaska to Mexico.

BLUE-WINGED TEAL *Anas discors* (choices 51 and 52, pg. 45) and **CINNAMON TEAL** *Anas cyanoptera* (choices 51 and 52', pg. 45) are pigeon-sized ducks. The males in breeding plumage are easy to distinguish from one another; in other plumages, however, they are similar. The Blue-winged Teal has a more spatulate bill (see Plate 13a). Also, Blue-winged Teal is paler and grayer (darker and browner for Cinnamon Teal) and has whitish lores offset by a dark transocular stripe. Cinnamon Teal has dark lores and no dark transocular stripe. On the west coast, Cinnamon Teal are far more common than Blue-winged Teal. The latter species is rare

to uncommon on the coast from Alaska south. Cinnamon Teal breed near the coast from British Columbia to Baja California and winter from central California south.

A few specimens of the GARGANEY *Anas querquedula*, a Eurasian species very similar in plumage to the Blue-winged Teal, have occurred along the west coast (inland). One should keep this in mind for specimens that key out to Blue-winged Teal. Consult a field guide if in doubt.

NORTHERN PINTAIL *Anas acuta* (choices 56 and 56', pg. 46). Males in breeding plumage have a very distinctive brown and white head and central tail feathers much longer than the outer ones. Birds in other plumages are mottled brown, but all have a white trailing edge to the wing and blue-gray bills. Pintails are the most common duck on the Pacific flyway. They breed from Alaska to California but not along the coast south of central British Columbia. They winter from the Aleutian Islands south.

NORTHERN SHOVELER *Anas chlypeata* (choices 50 and 50', pg. 45) has a wing similar in appearance but larger (see key) than those of Blue-winged and Cinnamon Teals. Shovelers have a distinctive spoon-shaped bill (Plate 14-1) and bright orange legs and feet. They breed from Alaska south to central California but except in Alaska occur inland. They winter from British Columbia south.

AMERICAN WIGEON *Anas americana* (choices 59 and 59', pg. 46). Wigeons are characterized by their white to gray upper wing coverts and greenish secondaries; their bills are bluish and black tipped; their dark flanks contrast sharply with their white belly. The American Wigeon's breeding range extends from Alaska to southern British Columbia but is primarily inland. During migration it occurs coastally from Alaska south and during winter from Puget Sound south.

The EURASIAN WIGEON *Anas penelope* occurs rarely with American Wigeons on the coast. It has dusky wing-pits; the American's are white. Male Eurasian Wigeons in breeding plumage have a mostly cinnamon head; the American's is gray, white and green.

REDHEAD *Aythya americana* (choices 27 and 27', pg. 42) is most similar in appearance to the Canvasback, RING-NECKED DUCK *Aythya collaris* and scaups. Head shape and bill length separate it from the Canvasback (see key and Plates 14a,b), lack of white secondaries from scaups and lack of a white base to the upper mandible from the Ring-necked Duck. Redheads are uncommon along the west coast; they winter in bays from Puget Sound to Baja California. Very small numbers breed in isolated locations near the coast in Alaska.

CANVASBACK *Aythya valisineria* (choices 26 and 26', pg. 42) is distinguished by its long sloping forehead and bill (well illustrated in field guides) in all plumages. Its bill is black in contrast to the bluish bill of the Redhead and scaups. Canvasbacks breed near the coast in some Alaskan locations; they winter from British Columbia south.

GREATER SCAUP *Aythya marila* (choices 34 and 34', pg. 43) and LESSER SCAUP *Aythya affinis* (choices 35 and 35', pg. 43) have distinctive white speculums bordered by dark brown or black on the trailing edge. The two species are difficult to separate; the wing characteristics offer the best clues (see key). Both species breed in Alaska. Greater Scaups winter from British Columbia to southern California, Lesser Scaups from British Columbia to Baja California.

COMMON GOLDENEYE *Bucephala clangula* (choices 43' and 44', pg. 44) and BARROW'S GOLDENEYE *Bucephala islandica* (choice 43' and 44, pg. 44) have dark wings with white speculums, white on some secondary coverts, small bills (Plate 15a-1,2) and yellow or orangish legs. Breeding-plumaged males have a white patch between the eye and bill. This patch is lacking in goldeneyes in other plumages. The shape of the white patch on the face of breeding-plumaged males is important to consider (see key and Plate 15b-1,2). The two species can be difficult to separate when not in male breeding plumage. The shape of the trachea and syrinx ("voice box") should then be noted (see Bellrose 1976). There is much less white on the dorsal innerwing coverts of the Barrow's Goldeneye.

Common Goldeneyes breed in Alaska. They winter from the Aleutian Islands to Baja California, but sparsely south of California. Barrow's Goldeneyes also breed in Alaska (south to Oregon in the interior mountains). They winter from the Aleutian Islands to San Francisco Bay but are much less common than Common Goldeneyes south of British Columbia.

BUFFLEHEAD *Bucephala albeola* (choices 45 and 45', pg. 45) has dark wings, a white speculum, a small flattened bill (Plate 15b-5), and a white patch on the head behind the eye. It breeds near the coast in Alaska; it winters from the Aleutian Islands to Baja California.

OLDSQUAW *Clangula hyemalis* (choices 14 and 14', pg. 41) vary considerably in plumage but all have white on the head, a dark-colored speculum, white sides, bluish legs and feet, and small bills (Plate 15a-3). Males often have very long central tail feathers, and a pink splotch on the bill (gray splotch in females; all ages). Oldsquaws breed along the coast of western Alaska. They winter from St. Lawrence Island, Alaska, south to California but become rare at the southern end of their range.

HARLEQUIN DUCK *Histrionicus histrionicus* (choices 21 and 21', pg. 42) has three white patches on the head. The brightly-colored male in breeding plumage has two patches behind the eye and one between the eye and bill; in other plumages it has white patches above, below and behind the eye. The bill is small (Plate 15a-4). The species nests near the coast from western Alaska to northern Washington. It winters from the Aleutian Islands to central California but is most abundant in Alaska.

STELLER'S EIDER *Polysticta stelleri* (choices 20 and 20', pg. 42) has a blue and white speculum similar to the Mallard's but unlike the Mallard it has much blue in the tertials. The male's secondary coverts are white in breeding plumage. The bill is shaped differently from other eiders (Plates 17, 18). In summer it occurs from west to south-central Alaska, in winter from the Alaska Peninsula west through the Aleutian Islands.

COMMON EIDER *Somateria mollissima* (choices 29 and 31', pp. 42-43). Males in breeding plumage have a distinctive white, black and green head and a distinctive sloping forehead and bill (Plate 17-2). In other plumages birds may be separated from King Eiders which have U- and V-shaped marking on the flanks, whereas the Common Eider's markings are wavy. Bill shape and lack of a spectacle separates Common from Spectacled Eiders. Common Eiders breed from southeast Alaska north. They winter primarily in the Bering Sea, but occasionally from Alaska to Washington.

KING EIDER *Somateria spectabilis* (choices 23 and 31, pp. 42-43). Breeding-plumaged males have a distinctive orange bill (Plate 17-4) and a black, white, green and bluish head. In other plumages it lacks the spectacles of the Spectacled Eider and the dark wavy bars on the flanks of the Common Eider. It occurs primarily in Alaska, rarely south to California.

SPECTACLED EIDER *Somateria fischeri* (choices 23' and 30, pp. 42-43) has a pale circular patch around the eye giving it the appearance of wearing goggles and a distinctive bill with feathers extending to the nostril (Plates 17, 18). It breeds along the Alaskan coast south to the Kuskokwim River. There are a few winter records from southwestern Alaska. They are extremely rare farther south.

WHITE WINGED SCOTER *Melanitta fusca* (choices 41 and 41', pg. 44) has brown to black wings contrasted with a white secondaries. Legs and feet are pink or orangish. Breeding-plumaged males have white feathering below the eye; females have a white patch between the eye and bill and another behind the eye. Immature males may have no white on the head. The species winters from southwest Alaska to Baja California and can occasionally be found over-summering in this area.

SURF SCOTER *Melanitta perspicillata*, choices 16, 16' and 17', pg. 41) and **BLACK SCOTER** *Melanitta nigra* (choice 17, pg. 41) have uniformly dark wings and backs. Males in breeding plumage are dark ventrally; females and juveniles are whitish ventrally. Surf Scoters have orangish legs. Males have a white patch on the back of the head and females and juveniles a white patch between the bill and eye and another behind the eye. Black Scoters are black-legged. Males have no white on the back of the head or on the bill; the sides of the head are largely whitish in females and juveniles. Surf Scoters winter from southwestern Alaska to Baja California and to some degree over-summer in their winter range. Black Scoters breed along the coast of western Alaska and winter from the Aleutian Islands to southern California.

RUDDY DUCK *Oxyura jamaicensis* (choice 12', pg. 40) is a small brown- or black-capped duck with a large whitish patch on the side of the head, uniformly dark wings, and bluish legs and feet. Breeding-plumaged males have striking blue bills and ruddy back coloration. Small numbers of Ruddy Ducks breed near the coast from Vancouver Island to Baja California. Much larger numbers winter along the coast in that area.

COMMON MERGANSER *Mergus merganser* (choices 38 and 38', pg. 44) and **RED BREASTED MERGANSER** *Mergus serrator* (choices 39 and 39', pg. 44) are narrow-billed

ducks (Plate 19). Bills and legs are orangish. The wings have white patches. Breeding-plumaged males have green head; in other plumages the head is brownish. The two species are best identified by characteristics given in the key. Red-breasted Mergansers breed near the coast through much of Alaska and northern British Columbia. They winter from southeast Alaska to Baja California. Common Mergansers breed near the coast from south-central Alaska to northern California. They winter from southeast Alaska to Puget Sound and less commonly to southern California.

GRUIFORMES

RAILS, GALLINULES, AND COOTS (RALLIDAE)

AMERICAN COOT *Fulica americana* (choice 7, pg. 25) is a slaty-gray bird with a black head and neck and white under the tail. An entire carcass, with its chicken-like bill (Plate 19-5) and lobed toes (Plate 37-4), is unmistakable. Wings of a coot might be confused with those of a murre because both have black secondaries with white tips. However, the outer edge of the outer primaries are white on the coot but not on the murre, and the coot's wings are much broader and less pointed. A coot's sternum is short, has a prominent keel, but overall is very narrow side-to-side (Plate 38e). American Coots may be found from British Columbia to Baja California year round.

CHARADRIIFORMES

OYSTERCATCHERS (HAEMATOPODIDAE)

AMERICAN OYSTERCATCHER *Haematopus palliatus* (choice 3, pg. 47) and AMERICAN BLACK OYSTERCATCHER *Haematopus bachmani* (choice 6, pg. 47) are moderate-sized, heavy-set birds with long laterally-compressed bill, red in adults and brown distally in juveniles. Bill size is not a good character for separating the two species. Adults of both species are pink-legged. The two species are easily distinguished. The Black Oystercatcher's plumage is entirely black-brown, but that of the American Oystercatcher is white ventrally. However, in northwest Baja California, one encounters a number of intergrades. Both species are year round residents in their ranges. American Oystercatchers have only rarely been found north of Baja California. Black Oystercatchers occur from the Aleutian Islands to northern Baja California but become relatively uncommon on the mainland coast south of central California.

AVOCETS AND STILTS (RECURVIROSTRIDAE)

BLACK-NECKED STILT *Himantopus mexicanus* (choice 6, pg. 47) is a slender moderate-sized, black and white shorebird with long, pink legs and a straight, slender bill (Plate 23-7). Breeding, winter, and juvenal plumages are very similar. It can be found from the San Francisco Bay area to Baja California year round.

AMERICAN AVOCET *Recurvirostra americana* (choice 7, pg. 47) is a slender, moderate-sized, long-legged bird with a distinctive, thin, upturned bill (Plate 23-6). In breeding plumage, worn from about February to August, their heads and necks are cinnamon; in winter plumage, worn from about August to February, heads and necks are light gray. Body feathering is black and white. Avocets occur along the coast from the San Francisco Bay area to Baja California year round and in northern California from late summer to spring. They are rare on the Oregon and Washington coasts.

PLOVERS (CHARADRIIDAE)

Plovers are small to moderate-sized shorebirds with short necks, large eyes and short bills that are swollen slightly at the tip (Plate 20). All charadriiformes have a sternum that is almost as deep as it is long (length is about 1.5 times the depth), with a prominent hook in the forward projection of the keel (similar to Dunlin and Marbled Godwit, Plate 38e).

AMERICAN GOLDEN PLOVER *Pluvialis dominica* (choice 16, pg. 50), **PACIFIC GOLDEN PLOVER** *Pluvialis fulva* (choice 16, pg. 50) and **BLACK-BELLIED PLOVER** *Pluvialis squatarola* (choices 4 and 25, pp. 47 and 51). These medium-sized birds superficially resemble one another in both winter and breeding plumages. Breeding plumage, possible from March to October, is mostly black ventrally; winter plumage is mostly white and gray-brown ventrally. These species have dark dorsal feathering with white to golden spotting. Black-bellies have short hind toes which the Golden lacks. The white rump and wing stripe of the Black-belly are also lacking in the Golden. Black-bellies have black axillar (wing pit) feathers; the Golden's axillaries are light. Any bird keying out to a Golden Plover should be given to a museum for confirmation (separated on the basis of the length of the primary feathers, and projection of these feathers beyond those of the tertials in the folded wing).

Black-bellied Plovers can be found year round from British Columbia to Baja California and in Alaska from April to October. Golden Plovers occur in Alaska from May through October. They occur as spring (very rare) and fall migrants from British Columbia to California. A few Golden Plovers winter in California (and are all *P. fulva*; mid-November through March). American Golden Plovers are much less common than Black-bellied Plovers along the coast south of Alaska. Pacific Golden Plovers occur as frequently as do the Americans.

SEMPALMATED PLOVER *Charadrius semipalmatus* (choice 28, pg. 52) is small (about two-thirds a Killdeer's size) with dark brown dorsal and white ventral plumage. A single dark ring

extends around the neck. Breeding-plumaged birds have an orange bill with a black tip, juvenal- and winter-plumaged birds have all black bills. Legs and feet are orange to yellow. It occurs in Baja California from July to May, in California year round, and from Oregon to Alaska from April to October. Note: juvenile Killdeer are small (like a Semipalmated) and have only one black neck ring.

WILSON'S PLOVER *Charadrius wilsonia* (choice 37, pg. 53) is slightly larger, has a longer, heavier bill (Plate 20-3) and a wider breast band than the superficially similar Semipalmated Plover. Wilson's Plover have black bills and pinkish legs. They occur year round from central Baja California southward.

KILLDEER *Charadrius vociferus* (choice 27, pg. 51) are large plovers with brown dorsal and white ventral feathering. They are distinguished by an orange rump and two dark breast bands. Killdeers occur sparingly in Alaska from April to August, and commonly from British Columbia south year round. See Semipalmated Plover (above).

SNOWY PLOVER *Charadrius alexandrinus* (choice 30', pg. 52) is a small, light grayish-brown backed, white-bellied bird. The neck markings do not form a complete ring as in other small plovers but appear as shoulder patches. Bill and legs are blackish. Snowy Plovers occur from Oregon to Baja California, and sparingly in Washington, year round. This species is listed as Threatened.

MOUNTAIN PLOVER *Charadrius montanus* (choice 30, pg. 52) has a golden brown back, white underparts, an all black bill, and light-colored legs. They lack a neck ring and a shoulder patch. Breeding-plumaged adults have a black forehead mark. They occur in Baja California and uncommonly along the coast to northern California from September to March.

SANDPIPERS (SCOLOPACIDAE)

Sandpipers vary markedly in size, leg and bill length, and bill shape (Plates 21-24). They range in size from the 20 gram Least Sandpiper to the 900 gram Long-billed Curlew. Sandpipers are generally longer-billed, longer-necked and smaller-eyed than the plovers. See Plate 38e, Marbled Godwit, for sternum shape.

BAR-TAILED GODWIT *Limosa lapponica* (choice 12, pg. 49) is moderate-sized and has a long, straight to slightly upturned bill (Plate 23-5). The tail is whitish to light tan with dark crossbars. Breeding plumage, possible from April to October, is reddish-chestnut to buffy-tan below and dark brown and cinnamon above. The winter plumage is gray-brown above and white to buffy-tan below. Juvenile plumage, worn into October, is rich brown, marbled with black, very similar to that of Marbled Godwit. The species occurs along the south coast of Alaska from May to September; it is very rare further south.

MARbled GODWIT *Limosa fedoa* (choice 10, pg. 49) is similarly shaped but slightly larger than the Bar-tailed Godwit. Marbled Godwits are marbled pinkish-tan and dark brown above and cinnamon below in all plumages; their tails are barred cinnamon and dark brown. They are common from California south year round and are increasingly less common during spring and fall migration as far north as southern Alaska.

WHIMBREL *Numenius phaeopus* (choice 11, pg. 49) is moderate-sized with a long, decurved bill (Plate 23-3), dark and light brown body feathering, and two dark brown crown stripes in all plumages. The rump and tail are barred, light and dark brown, and do not contrast with the back. Whimbrels occur in Baja California and California year round, but more commonly November to March; from Oregon to British Columbia from about November to March; and in Alaska from April to October.

BRISTLE-THIGHED CURLEW *Numenius tahitiensis* (choice 11, pg. 49) differs from the very similar Whimbrel in having tawnier dorsal and ventral body feathering, an unbarred orangish brown rump, and sometimes long bristle-like feather shafts on the belly and thigh. It is found along the coast of western Alaska near the Yukon River delta from May through August.

LONG-BILLED CURLEW *Numenius americanus* (choice 10, pg. 49) is a moderate-sized, cinnamon-colored bird with a long slender bill. It is the largest North American shorebird. It is more cinnamon in color and has less distinct dark head stripes than the other curlews. These curlews can be found year round in California and Baja California and during migration may be found along the Oregon and Washington coasts.

GREATER YELLOWLEGS *Tringa melanoleuca* (choices 12 and 17, pp. 49-50) and LESSER YELLOWLEGS *Tringa flavipes* (choice 17, pg. 50) are moderate-sized with straight, slender bills (the Greater's may be slightly upturned; Plate 22-2) and long, bright yellow legs that extend beyond the tail. Both species are slaty-backed and ventrally white with some dark streaking on the throat, sides and breast. Size, described in the key, is the best criterion for separating the two species. Both species may occur in Alaska from April to September, in Washington and Oregon between November to April, and in California and Baja California from July to May.

WILLET *Catoptrophorus semipalmatus* (choices 4 and 24, pp. 47 and 51) is a moderate-sized, gray or brown-backed bird with bluish-gray legs and a straight black bill (Plate 22-1). The extended wing shows a conspicuous white longitudinal bar on the dorsal and ventral surface. Breeding plumage, possible between March and August, is dorsally brown and heavily streaked and barred. Back feathers of juveniles are brownish with pinkish edges (from July to September), back feathers of winter birds are uniformly gray. Willets occur along the Washington (rare) and Oregon coasts as migrants between April and October. On the California and Baja California coasts they occur year round.

SPOTTED SANDPIPER *Actitis macularia* (choice 26, pg. 51) is small and straight-billed. It has light-colored legs, a grayish-brown back and white underparts which are black-spotted in

breeding plumage. It occurs on the Alaskan coast from May to October and on the coast from Washington south September into April.

WANDERING TATTLER *Heteroscelus incanus* (choice 18, pg. 50) is robin-sized, straight-billed, yellow-legged and ashy-colored dorsally. Winter plumage (about August to March) is white ventrally; breeding plumage (about March to August) ventrally is white, streaked with ashy on the throat and barred ashy on the belly. It occurs from Alaska to Oregon between April and September and may be found from California south July through April.

RUDDY TURNSTONE *Arenaria interpres* (choice 23', pg. 51) and **BLACK TURNSTONE** *Arenaria melanocephala* (choice 23, pg. 51) are stocky, robin-sized birds with stout, slightly upturned bills that taper to a point (Plate 21-7,8). Leg color varies from orange to black. The Ruddy Turnstone has a harlequin facial pattern, which is subdued in winter and juvenal plumage, a light and dark chest pattern (two black loops on a white chest), and a white throat. Breeding-plumaged birds have rusty backs. In contrast, the Black Turnstone has a uniformly dark brown to blackish head, throat and chest, and no rusty dorsal feathering. Ruddy Turnstones occur from Alaska to Oregon from May to October and from California south year round. Black Turnstones occur in northwestern Alaska from May to September and from southeastern Alaska south year round. There are no turnstones in California or Baja California during May or June.

WILSON'S PHALAROPE *Phalaropus tricolor* (choice 20, pg. 50) is robin-sized and is the largest of the three phalaropes. It is yellow-legged (juveniles have black legs and feet). Its toes are not as distinctively lobed as in the other phalaropes. Breeding females are patterned gray, chestnut, black and white dorsally. These colors are subdued in breeding males. In other plumages both sexes are gray or brown dorsally and white ventrally. In basic plumage, the species is most easily mistaken for Lesser Yellowlegs. They occur locally on the coast from Washington south between April and November but are much less likely to be encountered on the outer coast than the other two phalaropes.

RED-NECKED PHALAROPE *Phalaropus lobatus* (choice 34, pg. 53) and **RED PHALAROPE** *Phalaropus fulicaria* (choice 34', pg. 53). Carcasses of both these species are common at times on beaches. Both species have lobed toes and straight bills. Adult Red Phalaropes have yellowish (black in juveniles) and Red-necked have black legs. In winter plumage both species are gray above and white below but in breeding plumage Red-necked Phalaropes are strikingly patterned with black, brown, chestnut-buff and white, while Red Phalaropes are more uniformly-colored deep chestnut ventrally and blackish-brown dorsally. Breeding plumage in males is much more subdued than in females. The bill of the Red Phalarope often shows yellow basally, that of the Red-necked Phalarope is entirely black. The Red-necked Phalarope's bill is more needle-like than the Red's (Plate 21-2,3).

Red-necked Phalaropes occur in Alaska from April to September, in Washington to October, and in California to November. Red Phalaropes occur in Alaska from May through October and in Washington through November. From Oregon south they may be found between late September and early May.

COMMON SNIBE *Gallinago gallinago* (choice 14, pg. 49) is a little larger than a robin. Its bill is straight and very long (Plate 22-8). Its tail is mostly orange. In all plumages the snipe is various shades of brown and buff dorsally, has blackish crown stripes, and a white belly. It occurs in Alaska mainly between April and October and from coastal British Columbia south mainly between September and May. Because of its preference for freshwater marshes, snipes are likely to be very rare on beaches.

SHORT-BILLED DOWITCHER *Limnodromus griseus* and **LONG-BILLED DOWITCHER** *Limnodromus scolopaceus* (choice 19, pg. 50) are slightly larger than a robin. Their straight bills are very long (Plate 22-6,7). The legs are yellowish. They have a distinctive patch of white extending from the middle of the back to the rump. The tail is barred black and white. In breeding plumage they are rusty to salmon ventrally but in winter plumage they are drab gray-brown dorsally and white and gray-brown ventrally. The two species are very difficult to separate; only experienced observers should attempt to do so. See Pitelka (1950) for the best criteria to separate the two species. In Alaska dowitchers may occur between April and October, from British Columbia to northern California between November and mid-March and from northern California south year round.

SURFBIRD *Aphriza virgata* (choice 32, pg. 53) is slightly larger than a robin. Its bill is short and stout, and its yellowish legs are heavy-set. A triangle of black on its tail points toward its white rump. Dorsal feathering is variegated chestnut and blackish in summer but sooty-gray in winter. The breast is heavily marked with black chevrons in summer but is sooty-gray in winter. Surfbirds may occur on the coast from Alaska to Baja California August to mid-May.

RED KNOT *Calidris canutus* (choice 35, pg. 53), slightly larger than a robin, has a straight bill about the same length as the head (Plate 24-1). In breeding plumage, worn from about March to September, the bird is black, gray and rusty dorsally; ventrally it is rusty except for white under the tail. In winter plumage (about August to May) and juvenal plumage dorsal feathering is gray, and ventral feathering white. Knots can be found along the Alaskan coast from about April to August, along the Washington coast from about November to February and from California south from August to May.

SANDERLING *Calidris alba* (choice 33, pg. 53) is slightly smaller than a robin, has a fairly short, straight bill, and black legs. In contrast to other sandpipers, this species lacks a hind toe. Breeding plumage (May to August) is accentuated with rust on the back, head, throat and breast. Winter plumage is gray above and white below. Juveniles have black dorsal feathers that are edged with gray. Sanderlings occur on the Alaskan coast between May and September and south of there from July through May.

SEMPALMATED SANDPIPER *Calidris pusilla* (choice 44, pg. 54), **WESTERN SANDPIPER** *Calidris mauri* (choice 44', pg. 54), **RUFIOUS-NECKED STINT** *Calidris ruficollis* (choice 43', pg. 54), and **LEAST SANDPIPER** *Calidris minutilla* (choice 43, pg. 54) are sparrow-sized, brown- to grayish-backed, white-bellied sandpipers that are difficult to separate. Their bill shapes and lengths differ somewhat (Plate 24) and are important in identification. Rusty

coloration is prominent on the top of the head in the scapulars of breeding-plumaged Western Sandpipers (April-August) and on the throat and sides of the head of breeding-plumaged Rufous-necked Stint. Breeding-plumaged Least Sandpipers (April to August) have dark brown streaking over a light brown wash on the breast which is distinctive. The winter and juvenal plumages of the four species are very similar; field guides should be used to verify the identification of Least and Western sandpipers and comparison with museum specimens to verify the identification of Rufous-necked Stint and Semipalmated Sandpipers. Semipalmated Sandpipers are rare and Rufous-necked Stint very rare on the west coast. Least and Western Sandpipers in comparison are abundant.

Semipalmated Sandpipers occur on the west coast between May and September. Western Sandpipers occur in Alaska between April and September, and from British Columbia south, November to March. The Rufous-necked Stint occurs in Alaska from June to August and has been found only rarely as far south as California between May and August. Least Sandpipers occur in Alaska from April to September, in Washington south from December to April.

WHITE-RUMPED SANDPIPER *Calidris fuscicollis* (choice 41', pg. 54) is slightly larger than a sparrow, has black legs, wings that extend beyond the tail and a straight bill about the same length as the head. It has a white rump. The only other shorebird of similar size with a white rump is the Curlew Sandpiper. These two species can be separated by bill shape (Plate 24-7,8). White-rumped Sandpipers are very rare on the west coast.

BAIRD'S SANDPIPER *Calidris bairdii* (choice 40, pg. 54) is similar in size and shape to the White-rumped Sandpiper but it does not have a white rump. The bill and legs are black. Adults are dark brown and buff dorsally, sandy-gray and dusky-streaked on the breast and white on the belly. Juveniles are more salmon than buffy-colored dorsally. It occurs in limited numbers along the west coast in fall and rarely in spring.

PECTORAL SANDPIPER *Calidris melanotos* (choice 21', pg. 51) is variable in size, between that of a sparrow and a robin. The bill is straight and black, and is slightly longer than the length of the head. The legs are yellow-green. The breast is very heavily streaked with dark brown, but the streaking ends abruptly in a straight line where it meets the white belly. It occurs in limited numbers along the west coast in fall and rarely in spring.

SHARP-TAILED SANDPIPER *Calidris acuminata* (choice 21, pg. 50) is generally similar in size and coloration to the Pectoral Sandpiper. Juveniles, which are more likely than adults to occur on our coast, have breasts that are not streaked centrally but are washed with an orange-brown. The crown has considerable rufous coloration. Juveniles of this species occur rarely on the west coast as far south as California from late September to November.

ROCK SANDPIPER *Calidris ptilocnemis* (choice 39', pg. 54) is somewhat smaller than a robin and has a slender, decurved and tapered bill with a yellowish base, and dull yellowish to greenish legs. In breeding plumage back feathers are black with rufous, ochre, and white edges; the white under surface has a large dusky patch on the lower breast and belly. In winter and juvenal

plumage, birds are medium gray dorsally. They have heavy gray streaking on the neck and breast, but the belly is white. Rock Sandpipers may be found in Alaska year round and farther south from October to May.

DUNLIN *Calidris alpina* (choice 39, pg. 53) is between a sparrow and a robin in size. Its legs are black, as is its long, slightly downcurved, tapered bill. In breeding plumage (April to September) they have much rufous coloration dorsally and a black belly patch. Winter plumage is gray-brown dorsally and white ventrally. In juvenal plumage (July to September) dorsal feathering is edged with rufous; the throat and breast have diffuse streaking. Dunlins occur in Alaska from April to October and farther south from September to May.

CURLEW SANDPIPER *Calidris ferruginea* (choice 41, pg. 54) is a white-rumped bird between a robin and sparrow in size. The black bill is fairly long and radically decurved (Plate 24-8). Legs are black. In breeding plumage the ventral feathering is brick red, a color lacking in winter and juvenal plumages. The juvenile (and most likely to be seen south of Alaska) is very similar in plumage to that of the juvenile Baird's Sandpiper: warm pinkish-buff on neck and breast; scaly look to back and dorsal wing coverts, tertials and scapulars (the white rump, of course, is a giveaway). Curlew Sandpipers are rare on the west coast; they are most likely to be found between April and September.

SKUAS AND JAEGER (LARIDAE, subfamily STERCORARIINAE)

This group is closely related to gulls. Once a specimen has been identified as a skua or jaeger the key will suffice in identifying it to species. Without doubt, though, one's initial inclination will be to almost always consider a specimen from this group to be a gull in immature plumage. Owing to the brown coloration and general shape such a choice is not surprising. Closer inspection will reveal long sickle-shaped and sharp claws (Plate 35-1), reticulate rather than scutellate scales on the legs (Fig. 13), white shafts and bases to the otherwise dark outer primaries, and a saddle-shaped plate on the upper bill (Plate 25). None of these characters are possessed by gulls. The sternum, however, is not particularly distinctive relative to that of a gull (Plate 38f). The jet black or black and blue feet and legs, in conjunction with the mostly dark plumage, is a combination that should arouse one's suspicions that the specimen is not a gull. Since most specimens found on beaches are immatures or are molting, do not rely on length of the central two tail feathers, a feature often discussed in field guides, to confirm species identification. None of these species are very abundant. Any specimens south of Alaska should be saved.

SKUAS cf. SOUTH POLAR SKUA *Catharacta maccormicki* (choice 1, pg. 55) occurs throughout our area especially during summer and fall. All specimens should be saved.

POMARINE JAEGER *Stercorarius pomarinus* (choice 2, pg. 55), because of its large size, might be initially confused with the skua. This species, though, is actually much smaller. They

breed in Alaska and winter in tropical waters. Occurrence in the Bering Sea and in eastern North Pacific coastal waters is restricted to migratory periods, mainly in fall and less so in spring.

PARASITIC JAEGER *Stercorarius parasiticus* (choice 3, pg. 55) and **LONG-TAILED JAEGER** *Stercorarius longicaudus* (choice 3, pg. 55) are not separable on the basis of overall size, a character that will distinguish them from the previous two species. Consult the key and also Willett and Howard (1934) and Kaufman (1990) for identification. Occurrence is the same as for the Pomarine Jaeger. The Long-tailed Jaeger is probably more common (relative to other jaegers) in North American coastal waters than presently suspected.

GULLS (LARIDAE, subfamily LARINAE)

Gulls are a well-known group of birds. Within their group, however, they can be very difficult to tell apart. Most species have two or three immature plumages which compounds the problem. These immature plumages are sometimes very similar between species; often individual specimens can only be identified by consulting experts, and some specimens even then remain unidentified. Among gull species, the sternum is similar in shape, but different in size (Plate 38f). In spite of difficulties, much useful information can be obtained by the identification of the various species and age classes. Wings of badly decomposed specimens or specimens lacking heads can usually be identified by experts and are often worth saving. Complete references describing the plumages of gulls include Dwight (1925) and Grant (1986).

GLAUCOUS GULL *Larus hyperboreus* (choices 61-63, pp. 64-65) is a very large, white-primaried gull common only in Alaska. Small numbers can be found as far south as the California-Mexico border in winter. Most birds south of Canada are immatures. Caution must be exercised in dealing with individuals of other species that are albinistic or have very worn feathers. Glaucous Gulls are rarely pure white. Some individuals may appear pure white but most immatures will show buffy marbling at the base of the central tail feathers and adults show a pale gray mantle.

GLAUCOUS-WINGED GULL *Larus glaucescens* (choices 26, 41, 43 and 44, pp. 59, 62) is a large pale gull found commonly from Alaska to southern California. Except for the white windows in adults, this species characteristically has wing tips that are the same color as the inner primaries and secondaries (or only slightly darker white tips in some individuals). Extensive hybridization with the Western Gull in Washington provides numerous individuals whose specific identity is difficult or impossible to determine. Most hybrids show darker outer primaries than typical Glaucous-winged Gulls and have paler gray mantles than Western Gulls. These hybrids may be confused most readily with Herring and Thayer's Gulls, although these species have smaller, more slender bills than the hybrids. Also, Herring Gulls and most Thayer's Gulls have a distinct demarcation between the dark wing tips and the mantle while the Glaucous-winged X Western hybrids (as well as the northern race of the Western Gull) show the black of the wing-tips merging gradually with the gray or brown of the mantle area. Only

with the variation in these gulls will allow identification of many specimens. For more information on these hybrids see Hoffman et al. (1978). While Glaucous-winged X Western hybrids are present from British Columbia to California all year, Thayer's and Herring Gulls are absent in this region from April until late October.

SLATY-BACKED GULL *Larus schistisagus* (choices 28 and 48', pp. 60 and 63) is a large dark-backed gull that occurs along the coast of the western Pacific. Adults are similar to the Western Gull but are larger with a darker mantle and more white in the wing tips. First year birds are paler than other large dark-backed gulls, have a distinctive drab wing bar at the base of the secondaries, and a white chin. This species is a straggler in western Alaskan waters and accidental at best elsewhere along the North American coast. Any beached birds thought to be this species should be saved for comparison with existing specimens and for deposit in museum collections.

WESTERN GULL *Larus occidentalis* (choices 29', 48, 52 and 56; pp. 60, 63-64) is another large dark-backed gull more or less resident from Washington to the tip of Baja California. Specimens north of southern British Columbia should be saved. The dark mantle and large bill should separate this species from all but the preceding species. First year birds are much darker than other large gulls in the same plumage. Hybridization with the Glaucous-winged Gull in Oregon and Washington causes considerable identification problems which are discussed in the Glaucous-winged Gull account. This species occurs rarely in the Gulf of California where separation from adult Yellow-footed Gulls requires fresh specimens in which the leg color has not faded. Immature specimens can be difficult to separate from the Yellow-footed Gull. Any suspected Western Gulls from Gulf of California beaches should be saved. Specimens of the paler northern populations of the Western Gull (north of northern California) can be confused with Herring Gulls but the black of the wing tip merges gradually with the gray of the mantle in the Western Gull and is sharply demarcated in the Herring Gull. Usually the large thick bill will identify the Western Gull.

YELLOW-FOOTED GULL *Larus livens* (choices 29, 49' and 55, pp. 60, 63, 64) is a large gull essentially confined to the Gulf of California and the Salton Sea. It is similar to the Western Gull except for the bright yellow legs and feet of the adult, and in the sequence of immature plumages. In first-year birds, the Yellow-footed can be separated from the Western by the white belly of the Yellow-footed. In second-year birds, the feet of the Yellow-footed is already turning yellow. Any specimens found outside the Gulf of California should be deposited in a museum.

LESSER BLACK-BACKED GULL *Larus fuscus*; (not in key) has been recorded only once on the west coast south of Alaska. The adult with yellow legs might be confused with the Yellow-footed Gull but the Lesser Black-backed Gull is smaller with a more slender bill and a darker mantle. It is the only gull occurring in this region with a black mantle. Its immature plumages and measurements are similar to the Herring Gull and separation is difficult. Any specimen of this gull should be saved.

HERRING GULL *Larus argentatus* (choices 33', 50', 54 and 58; pp. 61, 63, 64) may be found in coastal waters throughout the area treated by this manual. It is often considered to be the typical sea gull. The characters in the key should identify most individuals. Herring Gulls are most likely to be confused with Thayer's Gull or Western X Glaucous-winged hybrids. Thayer's Gulls generally have more slender bills (Plate 26b-1, 2) and the underside of the outer primaries are pale, while the Herring Gull has dark underwing tips. See the Glaucous-winged Gull account for hints concerning the Glaucous-winged X Western intergrades. The Herring Gull is absent from the area British Columbia to California from April through late October; thus, any birds of this type present then are Glaucous-winged X Western hybrids.

THAYER'S GULL *Larus thayerii* (choices 33, 41', 43', 44', 49, 54' and 58'; pp. 61-64) occurs along the Pacific coast in winter, from southern British Columbia to southern California and less commonly in Alaska and Baja California. It is a medium-sized gull closely related to the Herring Gull. The combination of dark wing tips above and pale wing tips below is common to most individuals of all plumages. Only some of the Glaucous-winged X Western intergrades, which are much larger than Thayer's Gulls, share this characteristic. Adults can be further separated from the Herring Gull by the brownish eye and slender bill and from the California Gull by the pink legs. Immatures are more difficult but with practice can be identified by the characters used in the key. See discussion under Glaucous-winged Gull.

CALIFORNIA GULL *Larus californicus* (choices 32, 50, 53 and 57; pp. 60, 63, 64), a medium-sized gull, is common along the coast from southern Washington to Baja California. It is rare in British Columbia, and coastal Alaskan specimens should probably be saved. This species is quite similar to the Herring Gull but the gray of the mantle is distinctly darker, the legs of third-year and adult birds are gray to greenish-yellow and the eye is dark brown. First year birds are difficult to separate from the Herring Gull but typically the sharp demarcation between the pink base and black tip of the bill is distinctive.

RING-BILLED GULL *Larus delawarensis* (choices 31, 37 and 37'; pp. 60-61) a small to medium-sized gull, is found commonly in winter from Oregon to Baja California and rarely north to southern British Columbia. Specimens north of the latter area should be saved. The very pale gray mantle and ringed bill should identify all adult specimens. Immatures could be confused with immature Mew or California Gulls but characteristics in the key should clinch identification.

MEW GULL *Larus canus* (choices 30, 38 and 38'; pp. 60-61) is a small gull easily identified in adult plumage by the short, unmarked yellow bill. Immatures can be confused with immature Ring-billed Gulls but the small bill and the characteristics in the key should identify most specimens. The Mew Gull is a common winter visitor from Alaska to southern California and a common breeder throughout much of Alaska.

COMMON BLACK-HEADED GULL *Larus ridibundus* (choices 17 and 17', pg. 58) is accidental in western North America and any specimens should be saved. The extensive amount of white in the wings, and the small size of the bill and wing should separate this species from all other gulls, except Bonaparte's, which has the same wing pattern but an even smaller bill.

LAUGHING GULL *Larus atricilla* (choices 16 and 16', pg. 58) is the largest of the black-headed gulls. It breeds rarely in the Gulf of California and is accidental north to Oregon. Specimens outside the Gulf of California are worth saving.

FRANKLIN'S GULL *Larus pipixcan* (choices 11' and 22, pp. 57 and 59) is another small, black-headed gull occurring in this region. This species is rare along the coast from Washington south. Specimens could occur in nearly any month although northern regions would tend to accumulate winter records and southern regions summer records. The characteristics in the key should identify this gull.

BONAPARTE'S GULL *Larus philadelphia* (choices 13' and 14', pg. 57), is a small gull that nests in the western and central regions of Alaska and winters along the coast from central Washington through Baja California. The extensive white in the primaries is a character shared only by Common Black-headed Gulls, which can be separated from the Bonaparte's by size characters alone.

LITTLE GULL *Larus minutus* (choices 20 and 20', pp. 58-59) is a small gull, accidental along the Pacific coast of North America. Only a few records exist so any beached specimen is worth saving. Its small size will eliminate confusion with any other gulls, but its size might initially lead one to think it is a tern.

HEERMANN'S GULL *Larus heermanni* (choices 59-60', pg. 64) breeds on Baja California islands, particularly those in the Gulf of California. In the summer and fall they migrate north along the Pacific coast at least as far as southern British Columbia. This species is normally absent north of northern California in the winter and spring months. Specimens found north of southern British Columbia should be saved. First year specimens share plumage characteristics with the Flesh-footed Shearwater but lack the overall shape and the tube nostrils of the shearwater. The orange bill of the second-year bird and red bill of the adult distinguish this species from other gulls.

IVORY GULL *Pagophila eburnea* (choices 2 and 23, pp. 55 and 59) occurs regularly in our area only along the north coast of Alaska in summer. It is accidental elsewhere in Alaska. Any specimens of this gull away from the Arctic coast of Alaska should be saved. Ivory Gulls should be identified easily using the characters in the key.

BLACK-LEGGED KITTIWAKE *Rissa tridactyla* (choices 19 and 19', pg. 58) is a small gull common along the Pacific coast from Alaska to Baja California. It occurs rarely in the Gulf of California. Numbers south of Alaska vary tremendously from year to year. The small hind toe and short tarsus will separate a kittiwake from other gulls and the longer bill (Plate 27-4) and paler gray mantle will separate this species from the Red-legged Kittiwake. Ring-billed Gulls in their second-year plumage have all-black wing tips and are sometimes confused with Kittiwakes but their longer tarsus should prevent confusion.

RED-LEGGED KITTIWAKE *Rissa brevirostris* (choices 18 and 18', pg. 58) is common only near the Pribilof Islands, in the Bering Sea, and among some of the Aleutian Islands, where they breed. They occur in the waters near those islands in the winter. Specimens away from these areas should definitely be salvaged. This species can be told from the Black-legged Kittiwake by the darker gray of the mantle, the dark wing linings of the adult, and by the shorter bill (Plate 27-3).

ROSS' GULL *Rhodostethia rosea* (choices 10 and 14, pp. 56-57) occurs regularly along the north coast of Alaska in the fall and rarely at other seasons. It is very rare in the Bering Sea. Any beached specimens of this species anywhere are probably worth saving. The wedge-shaped tail is unique among gulls.

SABINE'S GULL *Xema sabini* (choices 21 and 21', pg. 59) breeds along the Arctic and Bering Sea coasts of Alaska and migrates to the Southern Hemisphere so could be conceivably found on any beach in our region. Most Sabine's Gulls migrate far out to sea so beached specimens are rare. The bold triangular wing pattern is distinctive in all plumages.

TERNs (LARIDAE, subfamily STERNINAE)

Although in the gull family, terns really bear little resemblance to gulls except that some have similar color pattern, i.e., gray above and white below, similar to some of the larger gulls. The combination of a slender, sharply pointed bill (no hook; Plates 29-30), short legs, a long tail that is usually forked, and, especially, long, narrow and pointed wings is characteristic of species in this group. The petrels also have long, narrow wings. Whereas the latter achieve greater wing length by a relative extension of proportions from shoulder to wrist, terns do so by having very long primary feathers. Thus, the wrist outward is the major portion of a tern's wing. We can really not add much more to what has been presented in the keys in the way of additional identification characteristics. One should be aware, however, that it is perhaps more likely to find a dead pigeon (ROCK DOVE) on the beach than it is to find a tern in many areas along the Pacific coast, and should only the wings of a pigeon be found, it will probably key to terns in the Key to Keys. A pigeon's wings are much broader than a tern's. The pigeon's sternum is similar to that of a coot (cf. Plate 38e and f).

Most terns are tropical or subtropical in distribution. In general, they occur either in estuarine or very protected waters, or they occur far at sea. As a result, they are infrequently encountered as specimens on marine beaches.

GULL-BILLED TERN *Sterna nilotica* (choices 13 and 13', pg. 66). If a specimen still has its head and one has decided it is a tern, then the heavily proportioned bill (Plate 30) (somewhat like that of a Bonaparte's Gull) should confirm its identity. Gull-billed Terns occur inland in southern California (Salton Sea), on the coast near San Diego, and south from Sonora along the Mexican coast to Ecuador. Thus, if they are to be found anywhere along the Pacific coast, it

would be most possible in the Baja California segment. Any specimen found should be saved for verification.

FORSTER'S TERN *Sterna forsteri* (choices 18 and 18', pg. 67), COMMON TERN *Sterna hirundo* (choices 22 and 22', pg. 68) and ARCTIC TERN *Sterna paradisaea* (choices 23 and 23', pg. 68). These species are quite similar in size and in other characteristics. Characters mentioned in the key should usually suffice in distinguishing them but some others may at times help. Although outer tail feathers are subject to a great deal of wear, in the outer tail feathers of the Forster's Tern the inner and outer vanes should be gray and white, respectively. In the other two species the outer web should be gray. During summer, the bill of an Arctic Tern is usually entirely a deep, blood red (sometimes dark at tip); in the other two it has a good deal of black at the tip and the red, if present (in summer quite extensively so), is more orange. In winter, the bills of all three turn all black. See Stallcup (1990) for more information in separating these species.

Forster's Terns occur in coastal waters from Washington southward from late summer to early spring. Their greatest abundance, and that of the Common Tern, in Pacific coastal waters occurs during spring and fall migrations. From Washington to northern California their occurrence is especially infrequent. Arctic Terns, from Washington southward, are present only during migration periods, late July to early October and May. North of Washington and especially from the Aleutian Islands north, they are present during the summer as well.

ALEUTIAN TERN *Sterna aleutica* (choices 20 and 20', pg. 67). Since this species occurs rather locally on coastal islands of the Bering Sea and off the Alaska Peninsula, one would have to distinguish it only from Arctic Terns. Besides the characters in the key, the Aleutian Tern's white forehead, black bill and gray back coloration, that is much darker than in the other species, should help in identification. Aleutian Terns nest on islands from Norton Sound (Bering Sea) south as far as Kodiak Island and in the eastern Aleutians. They migrate to Asia during non-breeding periods.

SOOTY TERN *Sterna fuscata* (choices 5 and 5', pp. 65-66). This species' very large size and the black coloration of upper parts set it apart from most other seabirds except perhaps the Black Skimmer; the white tips of the secondary feathers and large size of the secondaries would be sufficient to identify skimmers without heads. The Sooty Tern could also be confused with BRIDLED TERN *Sterna anaethetus*. In the latter (all age classes), the back of the neck is light gray (contrasting the dark nape and back), giving the appearance of a collar. The white of the forehead extends back, behind and over the eye, giving the appearance of an eyebrow in the Bridled Tern. A juvenile Sooty Tern is much different from the adult. It is dark brown all over with buffy feather tips, its wings are not as long and pointed and its tail is only slightly forked compared to the adult.

Sooty and Bridled Terns are oceanic. They could be encountered, infrequently, near the southernmost coasts of Baja California. Any specimens of black-backed tern should be saved for verification.

LEAST TERN *Sterna antillarum* (choices 16 and 16', pg. 67). Its very small size sets this species apart from other terns. If one found only a wing, without consideration of color, one might consider it to belong to a medium-sized shorebird. This species occurs from the spring to fall from San Francisco Bay southward. It is an Endangered Species.

ROYAL TERN *Sterna maxima* (choices 11 and 11', pg. 66) and ELEGANT TERN *Sterna elegans* (choices 14 and 14', pg. 67). No difficulty should be encountered in distinguishing these from one another or from other tern species. Both occur year round south of northern Baja California. During the fall and winter the Elegant Tern occurs as far north as Humboldt Bay (in some years to British Columbia). Royal Tern specimens found north of Point Conception should be saved for verification.

CASPIAN TERN *Sterna caspia* (choices 9 and 9', pg. 66). Like the latter two this species is quite distinctive from other terns, particularly because of its size. If one picked up a Red-billed Tropicbird, until a closer look was made, the Caspian Tern would probably be the first name to come to mind. They both are very light in coloration, are of similar size, and have large heavily proportioned red bills; compare Plates 4 and 29. It is, of course, far more likely to find a Caspian Tern in North American coastal waters than it is a tropicbird.

This species can be found year round in coastal waters from southern California southward, but more so during fall and winter. It occurs rather rarely along the Pacific coasts of Oregon and Washington during spring and fall migrations.

BLACK TERN *Chlidonias niger* (choices 3 and 3', pg. 65). An adult of this species is superficially similar to a juvenile Sooty Tern, but the larger size and buffy feather margins of the latter would readily separate the two species. Black Terns wander a good deal and thus one might conceivably encounter one in coastal waters as far north as Washington. Finding one is much more likely from California southward. The species breeds inland and winters from Panama southward. Thus it would occur off here mainly during migration, and especially the fall.

SKIMMERS (RYNCHOPIDAE)

BLACK SKIMMER *Rynchops niger* (choices 6 and 6', pg. 66). Except for its very distinctive bill (Plate 29), this bird is similar in morphology to terns. There should be no problem in distinguishing a specimen of this species, except in headless cases (see Sooty Tern).

Black Skimmers breed coastally in southern California, north to Santa Barbara. In the region covered by this manual, one is most likely to find them from southern California southward and very rarely as far north as central California. Any specimen found should be saved for verification.

ALCIDS or AUKS (ALCIDAE)

Auks are compact and, compared to their wing size, rather heavy-bodied birds. Their wings are surprisingly narrow, as in a petrel, but are rounded rather than pointed. Many auk species have a brightly-colored bill, mouth lining and feet (colors include yellow, orange, bright red and blue). They can offer some of the most difficult problems in identification for two reasons. First, the young of larger species are superficially similar in size and shape to adults of smaller species. The young of most seabirds leave the nest or nesting island when adult-sized but the young of some alcids leave nesting islands when very small and in some cases when just a few days old. Countless times young murrelets have been identified as murrelets. Second, most morphological variation among auks is confined to differences in size and in head characteristics. Thus, in a headless specimen only size and some subtle color differences can offer clues to identification. The sternum, much longer than deep, as in other diving birds, is particularly useful in separating headless murrelets from auklets (Plate 38g).

COMMON MURRE *Uria aalge* (choices 6', 7, 24 and 25, pp. 69, 73, 74) and **THICK-BILLED MURRE** *Uria lomvia* (choices 6, 7', 24 and 25, pp. 69, 73, 74). If the specimen has a head, one should have little difficulty in separating these two species. If it has no head then the task is not as easy. Common Murres have vertical black barring on sides and flanks, but Thick-billed do not (sides pure white). Both species breed abundantly from the Bering Straits to western Alaska, and the Common Murre from there to central California. During the non-breeding period, Common Murres occur from ice free Bering Sea waters to northern Baja California. Thick-billed Murres winter as far south as southeast Alaska and irregularly to central California. Any Thick-billed Murre specimen encountered south of southeast Alaska should be saved for verification. Young murrelets begin their sea-lives when only a quarter the size of adults.

BLACK GUILLEMOT *Cephus grylle* (choices 4 and 4', pg. 69) and **PIGEON GUILLEMOT** *Cephus columba* (choices 10 and 10', pg. 72). Wing color is the major character by which these two species can be separated. Size measurements can also be useful, as the following table shows (from Storer 1952) for specimens from the Bering Sea, where the two overlap in distribution (measurements in mm):

	Black Guillemot	Pigeon Guillemot
Wing chord	165-175	174-195
Tarsus	27-34	31-38
Exposed culmen	27-35	31-37

The two species occur year round as far north as ice free waters exist. The Black Guillemot does not occur south of the Bering Sea but the Pigeon Guillemot occurs as far south as southern California. During the late fall and winter, Pigeon Guillemots are uncommon in coastal waters south of British Columbia.

MARBLED MURRELET *Brachyramphus marmoratus* (choices 31 and 31', pp. 74-75), KITTLITZ'S MURRELET *Brachyramphus brevirostris* (choices 29 and 29', pg. 74), and ANCIENT MURRELET *Synthliboramphus antiquus* (choices 21 and 21', pg. 73). One should have no difficulty in distinguishing these species from one another, or from other murrelets, unless only part of a specimen is available. The following table (based on Sealy 1972; Jehl and Bond 1976; Bédard 1969; and Ridgeway 1919) may be useful (adult measurements in mm):

	Marbled	Kittlitz's	Ancient	Xantus'	Craveri's
Wing chord	120-140	127-141	132-149	111-128	107-124
Tarsus	13.9-17.6	15.5-16.5	24.6-28.0	21.2-27.5	21.0-24.5
Exposed culmen	13.2-17.6	9.5-10.5	12.2-15.1	15.6-21.4	18.0-22.5
Bill depth	5.3-7.0	5.1	6.4-8.5	6.2-6.5	4.6-5.9

Based on few specimens, range in measurements may be slightly greater; bill depth is an average.

Marbled Murrelets occur year round from southeast Alaska to central California and during fall and winter to southern California. Kittlitz's Murrelets occur year round, where ice-free waters exist, from the Bering Strait to southeast Alaska (extralimital records from San Juan Islands, Washington, and San Diego). Ancient Murrelets occur year round from the southern Bering Sea to British Columbia, and during the winter to northern Baja California. Any specimens of Marbled Murrelet south of the Channel Islands, or of Kittlitz's Murrelet south of southeast Alaska, should be saved for verification. The southern populations of the Marbled Murrelet are on the Endangered Species List.

XANTUS' MURRELET *Synthliboramphus hypoleucus* (choice 20', pg. 73) and CRAVERI'S MURRELET *Synthliboramphus craveri* (choice 24', pg. 74). Of the five murrelets these two are the most plainly marked. They closely resemble the murrelets, except in size; compare Figs. 26 and 27. Chicks accompany adults to sea when only a few days old and when feathered only in down. The above table of measurements may aid in identification, but be wary of the fact that only adults are included.

The Xantus' Murrelet may be found year round in Baja California and southern California waters. During early spring and late summer they occur as far north as Washington but in any abundance only as far north as central California. The occurrence pattern of Craveri's Murrelet is quite similar to the Xantus' but the Craveri's Murrelet is less abundant along the Pacific coast than the other. Any specimen of Xantus' Murrelet north of central California and of Craveri's Murrelet north of Pt. Conception should be saved for verification.

CASSIN'S AUKLET *Ptychoramphus aleuticus* (choice 23, pg. 73). Little more can be added than what is in the keys to aid in distinguishing the five auklets. One should have little difficulty

in doing so, unless the specimen is headless. The following table (based mostly on Ridgway 1919) may at times be useful (measurements in mm), but consider the fact that first-year auklets (measurements not in table) are slightly smaller than adults:

	Cassin's	Parakeet	Crested	Least	Whiskered
Wing	109-129	140-156	125-145	88-98	103-118
Tarsus	23-25	26-31	24-30	16-20	19-24
Exposed culmen	18-20	13-17	10-14	7-10	7-10

Cassin's Auklet is the most widely distributed of the five auklets. It occurs year round from islands off the Alaska Peninsula south to central Baja California. Any specimens from the Bering Sea should be saved for verification.

PARAKEET AUKLET *Cyclorhynchus psittacula* (choices 34 and 34', pg. 75), CRESTED AUKLET *Aethia cristatella* (choices 33 and 33', pg. 75) LEAST AUKLET *Aethia pusilla* (choices 19 and 19', pg. 73) and WHISKERED AUKLET *Aethia pygmaea* (choices 27 and 27', pg. 74). See comments regarding identification under Cassin's Auklet. These four species are largely restricted to ice free areas of the Bering Sea, waters around the Aleutians and eastward almost to Kodiak, Alaska. Parakeet Auklets on rare occasions have occurred as far south as central California. Specimens of any of these species encountered south of southeast Alaska, or even Kodiak, should be saved for verification.

RHINOCEROS AUKLET *Cerorhinca monocerata* (choices 15 and 16, pg. 72). This species is most similar to the first-year Tufted Puffin, but characters in the key, the darker belly and deeper bill of the latter should distinguish them (Plate 32). See table below under Horned Puffin. Rhinoceros Auklets occur year round from southeast Alaska to central California, and during winter to southern California.

HORNED PUFFIN *Fratercula corniculata* (choices 14 and 14', pg. 72). Because of its white face and underparts, this species cannot be easily confused with the Rhinoceros Auklet or the Tufted Puffin, the species to which it is most similar. The following table (from Ridgway 1919) may be of use (measurements in mm):

	Rhinoceros Auklet	Horned Puffin	Tufted Puffin
Wing chord	169-190	182-222	189-236
Tarsus	25-30	25-38	29-36
Exposed culmen	32-39	45-56	53-65

Horned Puffins occur year round, in ice free waters, from the Bering Strait south to British Columbia. They occur very rarely as far south as southern California, but regularly in small numbers to central California during the period from late winter to early summer.

TUFTED PUFFIN *Fratercula cirrhata* (choices 12, 12' and 16', pg. 72). For comments on identification see the above two species. Tufted Puffins occur year round, in ice free waters from the Bering Strait south to central California; south of British Columbia they are uncommon. On rare occasions they occur in southern California waters; they once bred in very low numbers on the northern Channel Islands.

BOOKS AND ARTICLES WITH ADDITIONAL INFORMATION ON MARINE BIRDS

- American Ornithologists' Union. 1983. Check-list of North American Birds, 6th Ed. A.O.U., Lawrence KS.
- Bédard, J. 1969. Adaptive radiation in Alcidae. *Ibis* 111:189-198.
- Bellrose, F.C. 1976. Ducks, Geese and Swans of North America. 2nd Edition. Wildlife Management Institute, Stackpole Books, Harrisburg PA. 544 pp.
- Binford, L.C., and J.V. Remsen. 1974. Identification of the Yellow-billed Loon. *Western Birds* 5:111-126.
- Bourne, W.R.P., E.J. Mackrill, A.M. Paterson and P. Yesou. 1988. The Yelkouan Shearwater *Puffinus puffinus yelkouan*. *British Birds* 81:306-319.
- Carney, S.M. 1964. Preliminary Keys to Waterfowl Age and Sex Identification by Means of Wing Plumage. Department of the Interior, Special Scientific Report, Wildlife 82.
- Cogswell, H.L. 1977. Water Birds of California. California Natural History Guides, No. 40. University of California Press, Berkeley.
- Coues, E. 1903. Key to North American Birds. 5th Edition. Estes and Lauriat, Boston. 1151 pp.
- Devillers, P. 1972. The juvenal plumage of Kittlitz's Murrelet. *California Birds* 3:33-38.
- Devillers, P. 1977. The skuas of the North American Pacific coast. *Auk* 94:417-429.
- Dwight, J. 1925. The gulls (Laridae) of the world: their plumages, moults, variations, relationships and distribution. American Museum of Natural History, Bulletin 52 (3):63-401.
- Flahaut, M.R. 1946. Identification of Red-billed Tropicbird taken in Washington state. *Murrelet* 28:22.
- Godfrey, W.E. 1966. The Birds of Canada. National Museum of Canada, Bulletin 203. 428 pp.
- Grant, P.R. 1986. Gulls: a Guide to Identification. Second Edition. Buteo Books, Vermillion, South Dakota. 352 pp.

- Harper, P.C., and F.C. Kinsky. 1978. Southern Albatrosses and Petrels: An Identification Guide. Victoria University Press, Wellington. 116 pp.
- Harrison, P. 1985. Seabirds: an Identification Guide. Revised Edition. Houghton Mifflin Company, Boston. 448 pp.
- Harrison, P. 1987. A Field Guide to Seabirds of the World. The Stephen Greene Press, Lexington, Mass.
- Hoffman, W., J.A. Wiens, and J.M. Scott. 1978. Hybridization between gulls (*Larus glaucescens* and *L. occidentalis*) in the Pacific northwest. *Auk* 95:441-458.
- Jehl, J.R., Jr. 1982. The biology and taxonomy of Townsend's Shearwater. *Le Gerfaut* 72:121-135.
- Jehl, J.R., Jr., and S.I. Bond. 1976. Morphological variation and species limits in murrelets of the genus *Endomychura*. *San Diego Society of Natural History, Transactions* 18(2):9-24.
- Kaufman, K. 1990. A Field Guide to Advanced Birding. Houghton Mifflin Company, Boston. 299 pp.
- King, W.B. 1967. Seabirds of the Tropical Pacific. Preliminary Smithsonian Identification Manual. Smithsonian Institution, Washington, D.C. 126 pp.
- Koslova, E.V. 1957. Charadriiformes, suborder Alcae, in *Fauna of the U.S.S.R.*, Vol. II (No. 3). Israel Program for Scientific Translations, Jerusalem (1961), National Technical Information Service, Washington, D.C.
- Kuroda, N. 1954. On the Classification and Phylogeny of the Order Tubinares, Particularly the Shearwaters (*Puffinus*). Herald Co., Tokyo. 179 pp.
- Loomis, L.M. 1918. A review of the albatrosses, petrels, and diving petrels. *California Academy of Sciences, Proceedings* II, pt. 11, No. 12:1-187.
- Murphy, R.C. 1952. The Manx Shearwater, *Puffinus puffinus*, as a species of world-wide distribution. *American Museum Novitates* No. 1586. 21 pp.
- Palmer, R.D. (ed.). *Handbook of North American Birds*, Vol. I (1962), Loons-Flamingoes; Vol. 2 and 3 (1976), Waterfowl. Yale University Press, New Haven.
- Pitelka, F.A. 1950. Geographic variation and the species problem in the shore-bird genus *Limnodromus*. *University of California, Publications in Zoology* 50:1-108.
- Prater, A.J., J.H. Marchant and J. Vuorinen. 1977. Guide to the Identification and Aging of Holarctic Waders. *British Trust for Ornithology, Guide* 17. Tring.
- Ridgway, R. 1919. *Birds of North and Middle America*, Vol. VIII. U.S. National Museum, Bulletin 50. 852 pp.
- Robbins, C.S., B. Bruun, and H.S. Zim. 1966. *Birds of North America, A Guide to Field Identification*. Golden Press, N.Y. 340 pp.
- Sealy, S.G. 1972. Adaptive Differences in Breeding Biology in the Marine Bird Family Alcidae. PhD Dissertation, University of Michigan, Ann Arbor.
- Stallcup, R. 1990. *Ocean Birds of the Nearshore Pacific*. Point Reyes Bird Observatory, Stinson Beach, CA. 214 pp.
- Storer, R.W. 1952. A comparison of variation, behavior and evolution in the sea bird genera *Uria* and *Cephus*. *University of California, Publications in Zoology* 52:121-222.

Taverner, P.A. 1928. Birds of Western Canada. National Museum of Canada, Bulletin 41. 379 pp.

Willett, G. and H. Howard. 1934. Characters differentiating certain species of *Stercorarius*. Condor 36:158-160.

MARINE MAMMALS

Presented here are keys to marine mammals of the North American west coast. These are preceded by a glossary and are followed by species accounts that refer to geographical and seasonal occurrence. Invaluable aids to us were the information and keys in Scheffer (1958) and Tomilin (1957). The bibliography, after the species accounts, contains complete citations of these books.

Marine mammal carcasses are often difficult to distinguish, especially if they are not very fresh. The carcass of a large shark can superficially resemble a cetacean, especially a dolphin (see Fig. 29 and Key to Sharks and Rays). Compared to marine birds, they are rather limited in their variety of sizes, shapes and colors and thus differences among them are less distinct. Therefore, the mammal species accounts offer few additional identifying morphological characteristics. Also, in several instances the mammal keys lead only to a group of similar species because further identification is exceedingly difficult. One should at least attempt to identify a carcass to a major group; for example, it is usually relatively easy to distinguish between a fur seal, seal and sea lion. Beyond that, identification becomes increasingly difficult; for instance, in dolphins and seals you will likely have to consider the shape, placement and number of teeth in each side of the upper and lower jaws. Some species within certain groups of seals and dolphins cannot be readily distinguished unless the skull is examined. If you wish to know more, then refer to publications listed further on or contact a local natural history museum. Make it clear that if they inspect or collect the carcass (and often someone will), you would like to know more about it. Whatever you do, leave the carcass on the beach; it is against the law to remove it without a permit. All marine mammals are protected in U.S. waters.

MEASUREMENTS AND GLOSSARY OF TERMS

Axilla - armpit.

Baculum - a slender bone within the penis of some mammals. It lies well beneath the skin, between the penile opening and the anus, and can be used in the identification of sea otters, seals, sea lions, and walrus (Plate 39).

Baleen - the horny fringed plates hanging from the roof of the mouth of some cetaceans (Fig. 28). Color and bristle texture will aid in identification; plate counts also vary.

Beak - the forward portion of the head of some cetaceans in front of the forehead. It is constricted relative to the forehead (Figs. 29, 30; see Snout and Rostrum).

Blowhole slit - the external opening of the breathing apparatus when the opening is closed (Fig. 28). Can be circular, paired or crescent.

Canine - (canine tooth) the large teeth just behind the incisors. There is one such tooth in each side of upper and lower jaws (Fig. 31).

Cetacean - a member of the order Cetacea: a whale (baleen or toothed), dolphin, or porpoise.

Cusps - the bumps or projections on the biting surface of teeth (see Molar in Fig. 31).

Dorsal - the upper surface (Fig. 29).

Flukes - the horizontally broadened portion of a cetacean's tail (Fig. 29).

Guard hairs - longest, stiffest and most apparent hairs in a mammal's coat. This contrasts with the short, velvety underfur beneath the guard hairs.

Longitudinal - a line along the anterior-posterior axis; in marine mammals, along the length of the body.

Palate - the roof of the mouth (Figs. 36, 38, 40).

Pelage - fur.

Pinna (plural, pinnae) - the external ear.

Pinniped - a member of the order Pinnipedia: a seal, sea lion, fur seal or walrus; literally, feather-foot.

Plate - a single sheet of baleen (Fig. 28).

Postcanine - one of those teeth posterior to the canines; the premolars and molars (Fig. 31).

Rostrum - forward or anterior extension of the skull (as in Beak; Figs. 29, 30, 40).

Snout - nose; frequently synonymous with Beak or Rostrum (Figs. 29, 30, 37, 40).

Symphysis - a line of junction or articulation, for example, where the two premaxillary bones meet at the front of the upper jaw (Fig. 31).

Total length (or maximum length) - the straight line distance between the tip of the snout and the tip of the tail (pinnipeds) or the notch of the flukes (cetaceans; Fig. 30).

Transverse - a line across the body, from one side to the other.

Umbilicus - the navel, or depression on the middle of the abdomen indicating the point of attachment of the umbilical cord (Figs. 29, 34).

Underfur - see Guard hairs.

Ventral - the undersurface (Fig. 29).

Figure 28. Some baleen whale terms used in the keys.

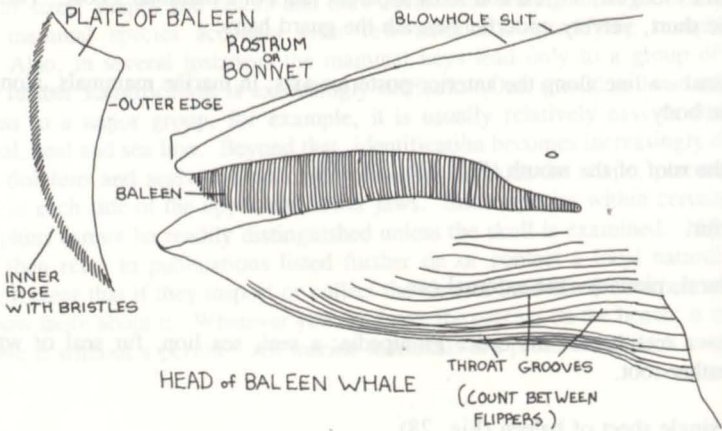


Figure 29. Some cetacean terms used in the key with a shark for comparison.

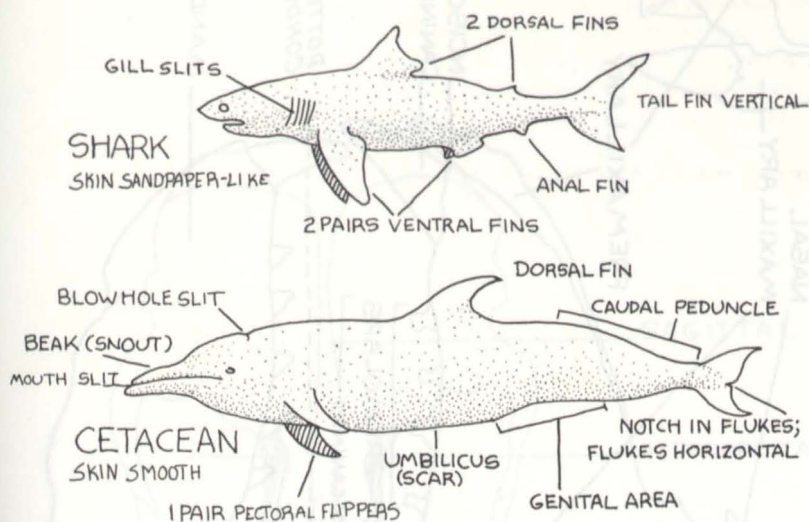


Figure 30. Measurements used in the cetacean keys.

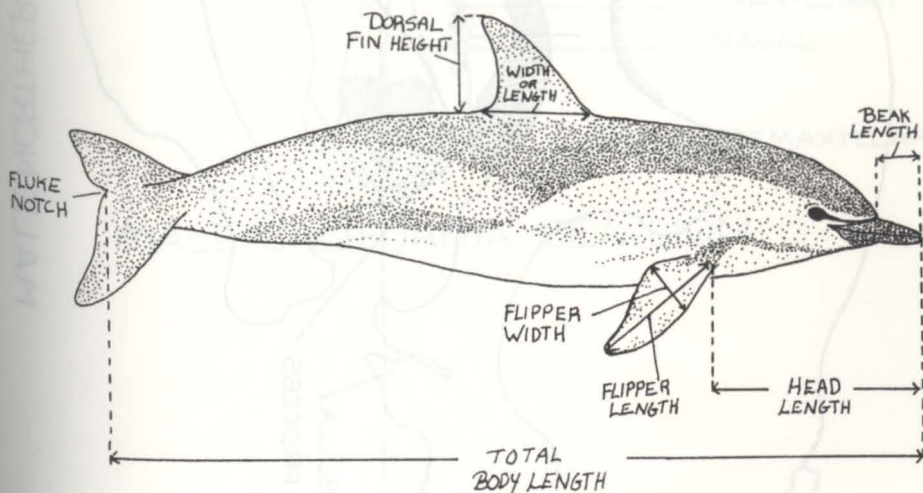


Figure 31. Some parts of a pinniped skull.

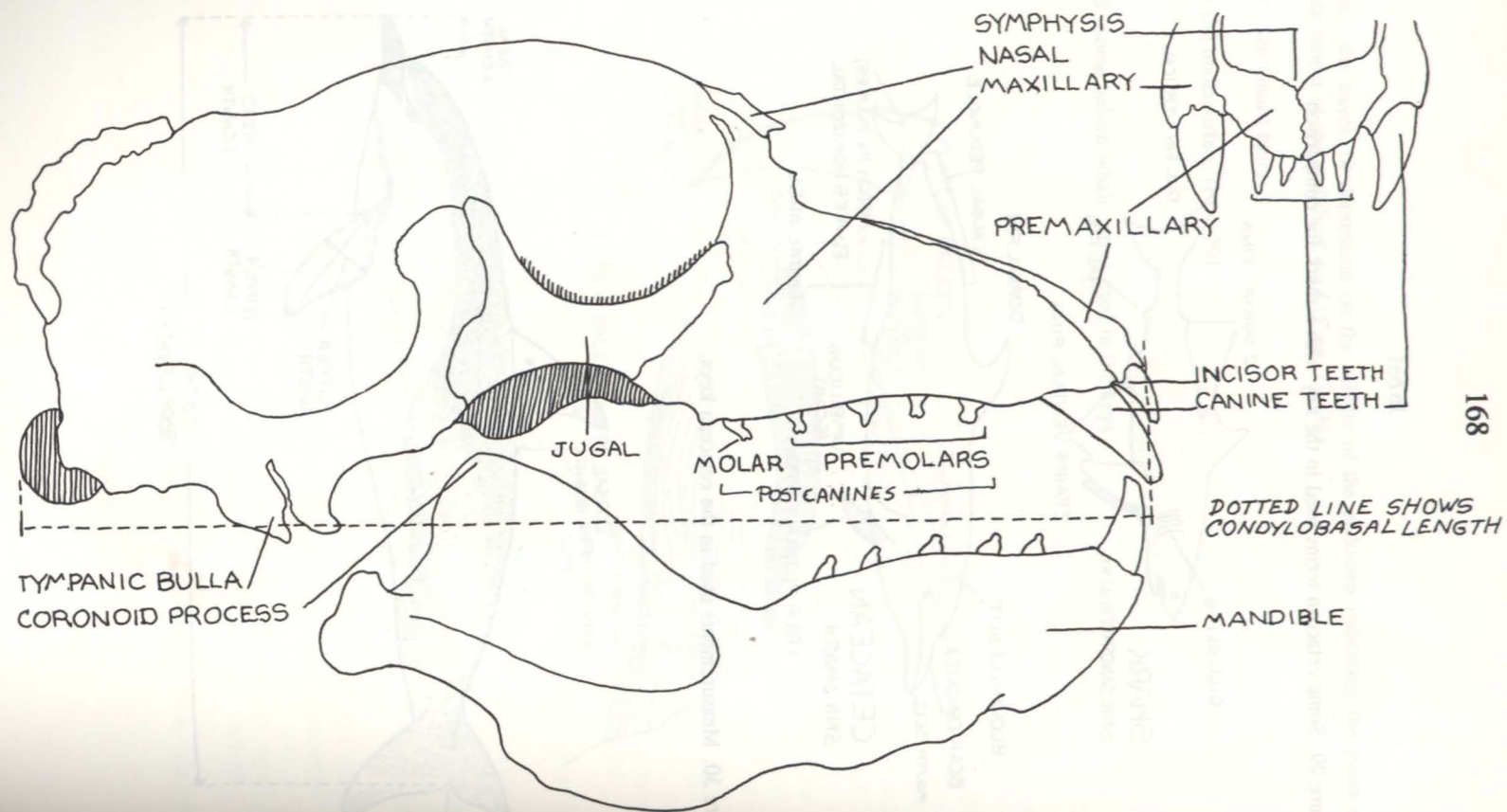
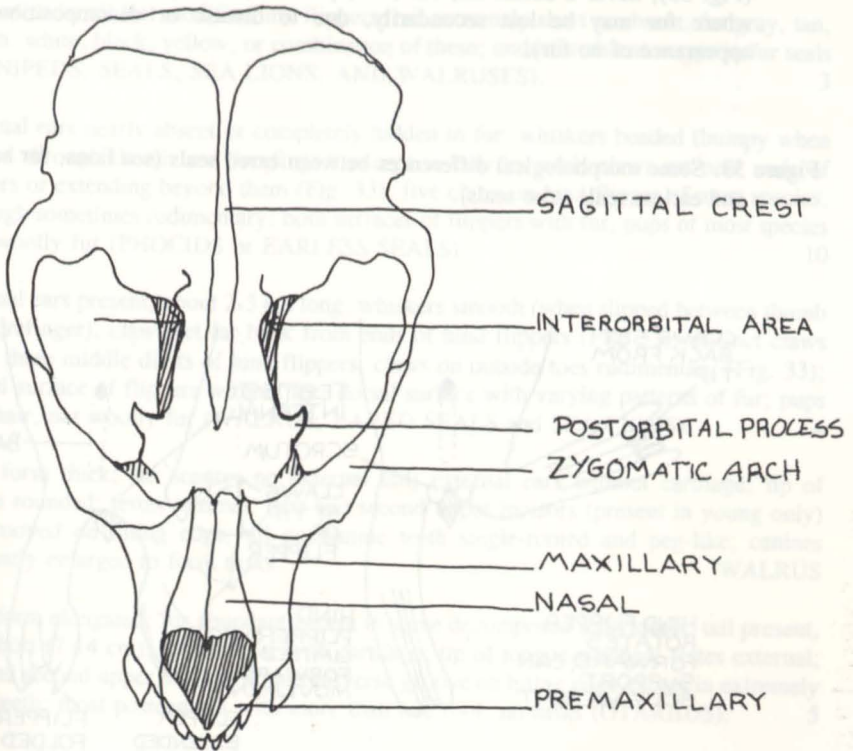


Figure 32. Dorsal view of a pinniped skull.

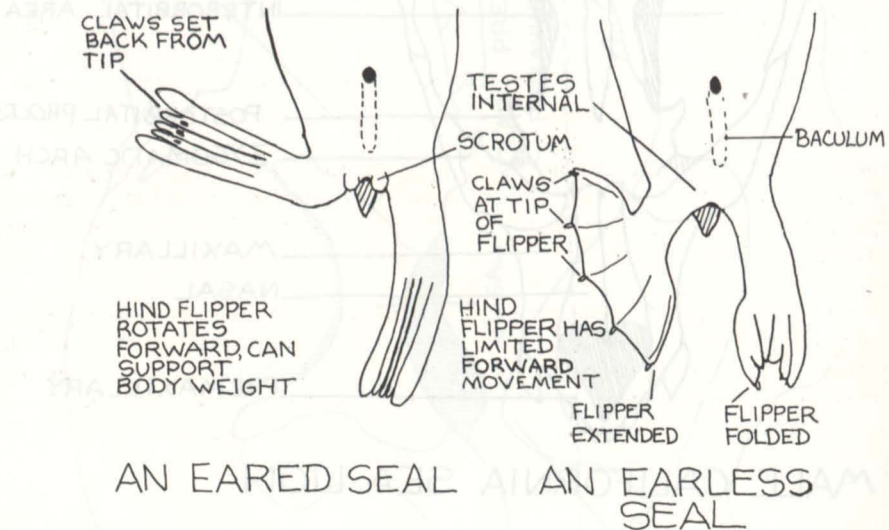


MALE CALIFORNIA SEA LION

KEY TO MARINE MAMMALS

- 1 Two limbs, located in the front half of the body; posterior end of body modified into a single horizontal fluke (Figs. 29, 41); a fin sometimes present on back (Fig. 29); no fur (some specimens have single, widely spaced hairs or hair follicles on their jaws). 16
- 1 Four limbs, two forward and two posterior; posterior limbs modified into two flippers (Fig. 33); never a dorsal fin; fur (hair) present (some specimens have extensive areas where fur may be lost secondarily, due to disease or decomposition, giving the appearance of no fur). 2

Figure 33. Some morphological differences between eared seals (sea lions, fur seals) and earless seals (true seals).



KEY TO MARINE MAMMALS (Continued)

- 2 Foot-pads present (as on the bottom of a dog's foot); fore-feet not modified into flippers; tail extending beyond out-stretched hind foot; fur medium brown to grayish to blackish, sometimes whitish about muzzle (pups sometimes rufous); underfur present and obvious; guard hair sparse (SEA OTTER). 15
- 2' No foot pads; all feet modified into flippers; tail extremely short or absent; fur gray, tan, brown, white, black, yellow, or combination of these; underfur absent *except* in fur seals (PINNIPEDS: SEALS, SEA LIONS, AND WALRUSES). 3
- 3 External ears nearly absent or completely hidden in fur; whiskers beaded (bumpy when slipped through thumb and forefinger) except in bearded seal; claws set near ends of flippers or extending beyond them (Fig. 33); five claws on hind flipper of most species, although sometimes rudimentary; both surfaces of flippers with fur, pups of most species with woolly fur (PHOCIDS or EARLESS SEALS). 10
- 3' External ears present, about 2-3 cm long; whiskers smooth (when slipped between thumb and forefinger); claws set far back from ends of hind flippers (Fig. 33); distinct claws on all three middle digits of hind flippers, claws on outside toes rudimentary (Fig. 33); ventral surface of flippers without fur, dorsal surface with varying patterns of fur; pups have hair, not woolly fur (WALRUS, EARED SEALS and SEA LIONS). 4
- 4 Body form thick; fur scanty; no external tail; external ears without cartilage; tip of tongue rounded; testes internal; first and second upper incisors (present in young only) not grooved on biting edge; all postcanine teeth single-rooted and peg-like; canines frequently enlarged to form tusks. WALRUS
- 4' Body form elongated; fur abundant except in some decomposed individuals; tail present, very short (7-14 cm); external ear with cartilage; tip of tongue notched; testes external; first and second upper incisors with transverse groove on biting edge except in extremely worn teeth; most postcanines with more than one root; no tusks (OTARIIDS). 5

KEY TO PINNIPEDS AND OTTERS

- 5 Underfur not present; pelage consists of short, stiff hairs; foreflippers with first digit (same position and analogous to human thumb) longer than second; outermost and innermost digits of hind flippers longer than middle three; short hind flippers, half (or less) than distance from base of hind flipper to axilla; usually five teeth behind long canines on upper jaw; nose not particularly pointed (SEA LIONS). 6
- 5 Underfur present (guard hair hides underfur so that hair must be parted to reveal this thick growth of velvety fur); fore-flippers with first digit shorter than second; all digits on hind flippers about equal in length; long hind flippers, about three-quarters the distance from base of hind flipper to axilla; usually six teeth behind canines on upper jaw; nose pointed (FUR SEALS). 9
- 6 Male (Fig. 34). 7
- 6 Female (Fig. 34). 8

Figure 34. Some morphological differences between male and female pinnipeds.

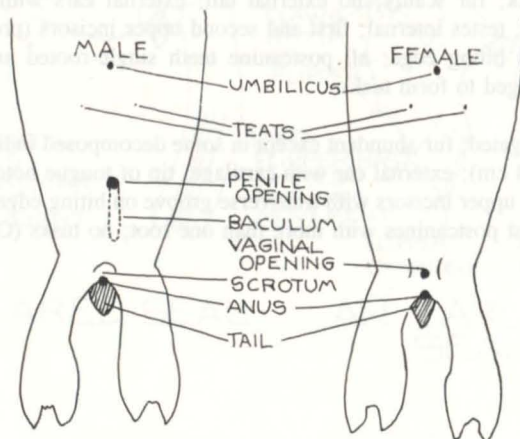
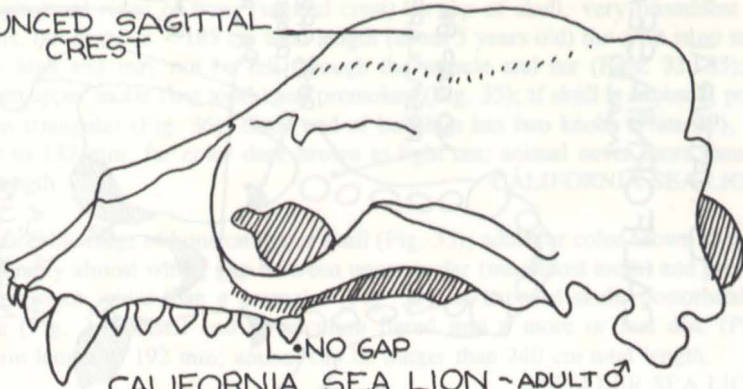


Figure 35. Sea lion skull comparisons.

 $(\frac{1}{3}$ NATURAL SIZE)

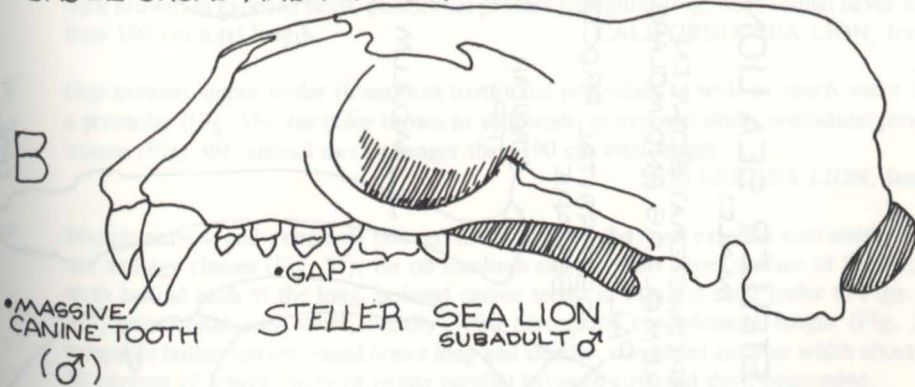
•PRONOUNCED SAGITTAL
CREST

A



•SKULL BROAD AND FLATTER - CREST LESS PRONOUNCED

B



C

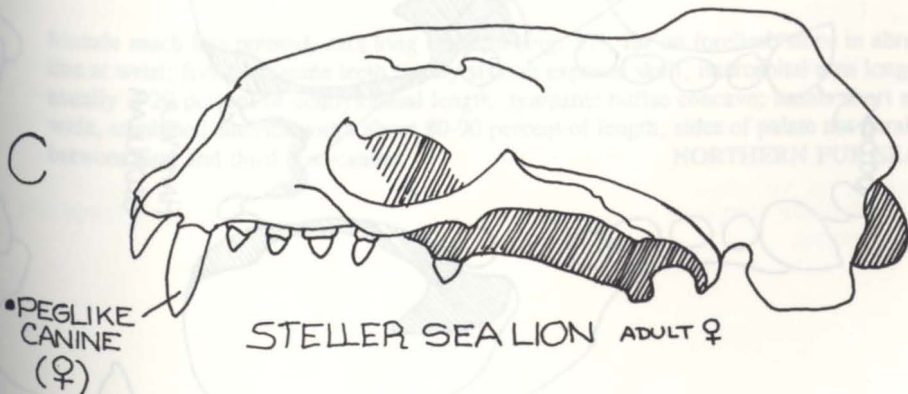
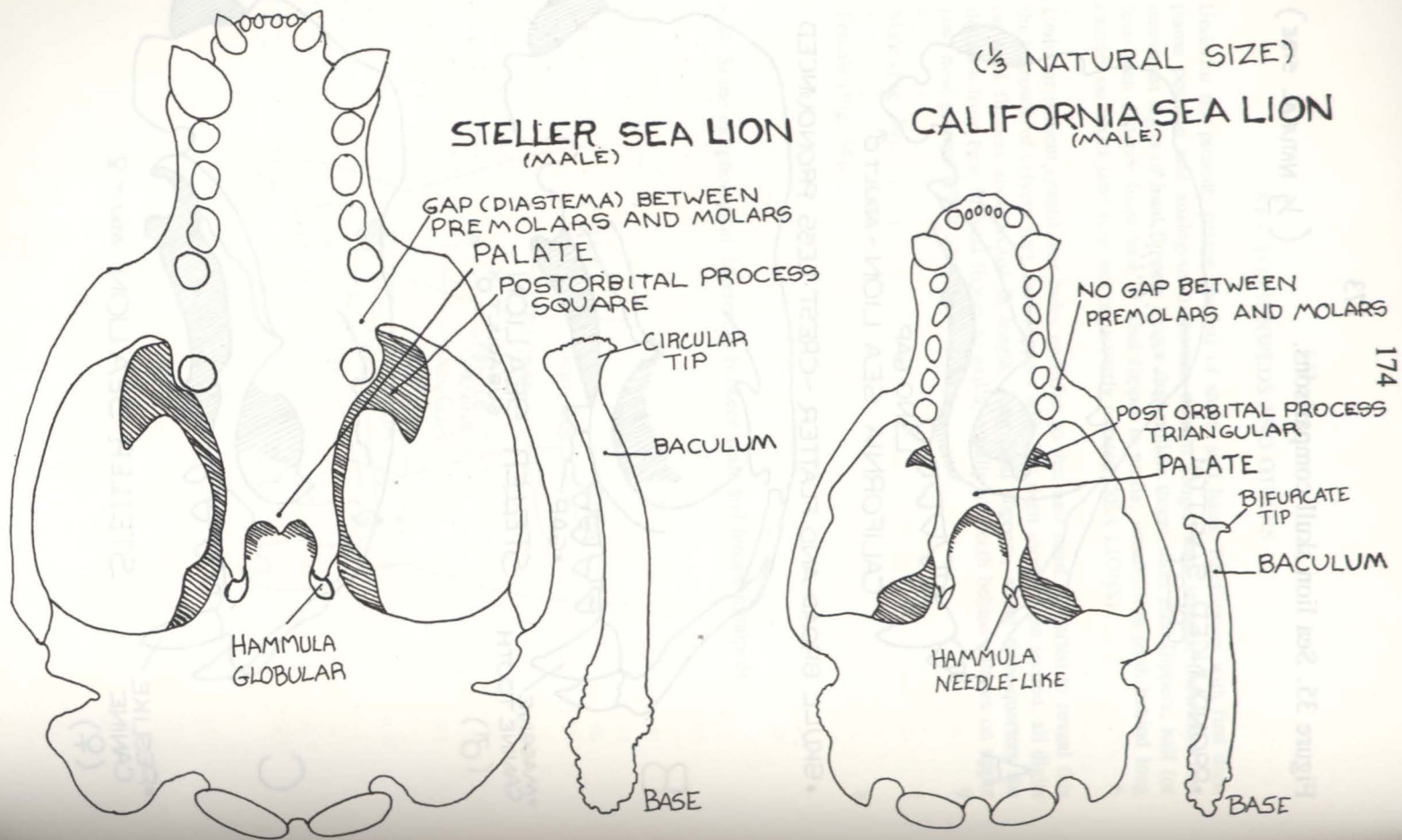


Figure 36. Differences between California and Steller sea lion skulls and bacula.

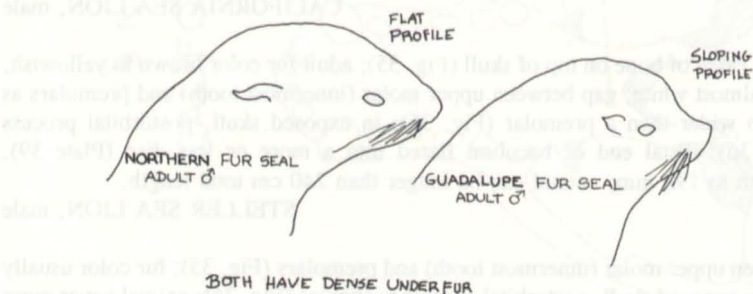


KEY TO PINNIPEDS AND OTTERS (Continued)

- 7 A longitudinal ridge of bone (sagittal crest) on top of skull, very prominent in older animals, but in those < 185 cm total length (about 5 years old) the crest is no more than 5 mm high and may not be felt through the muscle and fur (Figs. 32, 35); no gap between upper molar (last tooth) and premolars (Fig. 35); if skull is exposed, postorbital process triangular (Fig. 36); distal end of baculum has two knobs (Plate 39), baculum length to 137 mm; fur color dark brown to light tan; animal never more than 240 cm total length.
CALIFORNIA SEA LION, male
- 7 No noticeable ridge of bone on top of skull (Fig. 35); adult fur color brown to yellowish, occasionally almost white; gap between upper molar (innermost tooth) and premolars as wide or much wider than a premolar (Fig. 35); in exposed skull, postorbital process square (Fig. 36); distal end of baculum flared into a more or less disc (Plate 39), baculum length to 192 mm; animal can be longer than 240 cm total length.
STELLER SEA LION, male
- 8 No gap between upper molar (innermost tooth) and premolars (Fig. 35); fur color usually dark brown; in exposed skull, postorbital process triangular (Fig. 36); animal never more than 190 cm total length.
CALIFORNIA SEA LION, female
- 8 Gap between upper molar (innermost tooth) and premolars as wide or much wider than a premolar (Fig. 35); fur color brown to yellowish; in exposed skull, postorbital process square (Fig. 36); animal can be longer than 190 cm total length.
STELLER SEA LION, female
- 9 Muzzle narrow and extremely pointed (as in a collie dog) and external ears stubby in all sex and age classes (Fig. 37); fur on forelimb extends onto upper surface of flipper; six teeth behind each of the long, pointed canine teeth; in exposed skull (refer to Figs. 31, 32), interorbital area short, usually < 20 percent of condylobasal length (Fig. 31); tympanic bullae convex; nasal bones long and slender, combined anterior width about 40-50 percent of length; sides of palate parallel between first and third postcanine.
GUADALUPE FUR SEAL
- 9 Muzzle much less pointed, ears long and thin (Fig. 37); fur on forelimb stops in abrupt line at wrist; five postcanine teeth (rarely six); in exposed skull, interorbital area longer, usually > 20 percent of condylobasal length; tympanic bullae concave; nasals short and wide, combined anterior width about 80-90 percent of length; sides of palate not parallel between first and third post-canine.
NORTHERN FUR SEAL

KEY TO PINNIPEDS AND OTTERS (Continued)

Figure 37. Fur seal head comparisons.



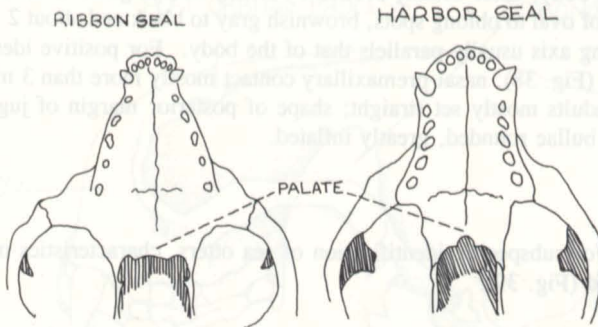
- 10 Six incisors at front of upper jaw (Fig. 31); hind toes nearly equal in length. 11
- 10' Four incisors at front of upper jaw; inner and outer hind toes clearly longer than middle three; color grayish to brownish (pups very dark, black), not spotted or banded; when molting, large patches of fur appear to drop off, giving a (false) diseased appearance; nails of hind flippers rudimentary. NORTHERN ELEPHANT SEAL
- 11 Whiskers smooth, thick, straight, conspicuously bushy; third digit of foreflipper longest, the flipper being broad and blunt with all claws near tip; no longitudinal ridge of bone on top of skull; mammary teats four; teeth of adults loosely rooted, often worn down to surface of jaw or lost entirely; spaces between teeth behind canines almost tooth width. BEARDED SEAL
- 11' Whiskers beaded, slender, curled, not bushy; third digit of foreflipper shorter than first and second; the flipper tapered with digits decreasing in length from first ("thumb") to last; sagittal crest present in some species; mammary teats two; teeth of adult firmly rooted; spaces between postcanine teeth less than tooth width. 12
- 12 Posterior margin of palate distinctly notched or incised (Fig. 38); adult pelage may be spotted. 13

KEY TO PINNIPEDS AND OTTERS (Continued)

- 12' Posterior margin of palate not notched, nearly a straight line (Fig. 38); adult pelage not spotted except in some females that have just reached maturity; adult female pale grayish with obscure narrow whitish bands running transversely across lower back; adult male dark brown with conspicuous, broad, light-colored bands, one around neck and dorsal part of head and one around hind portion of body, with branches directed anteriorly.

RIBBON SEAL

Figure 38. Seal skull comparisons; ventral view.



- 13 Claws more or less triangular in cross section, with distinct dorsal ridge; pelage on back harsh to the touch, hairs coarse, tips pointing directly backward; spots large and ring-shaped. For positive identification, skull is needed (Fig. 31): skull of old individuals without sagittal crest; mandibular teeth always aligned with jaw, never crowded; first postcanines of lower jaw usually with three cusps, the middle cusp largest; inner side of lower jaw between middle postcanine teeth concave.

RINGED SEAL

- 13' Claws nearly semicircular in cross section, without distinct dorsal ridge or growth rings, pelage on back smooth to the touch, hairs' finer tips curved downward; spots small. For positive identification, skull is needed (Fig. 31): skull of old individuals with low sagittal crest; mandibular teeth may be crowded out of line and overlapping; first postcanine teeth of lower jaw usually with four cusps, the second cusp from the anterior end largest; inner side lower jaw between middle postcanine teeth convex.

14

KEY TO PINNIPEDS AND OTTERS (Continued)

- 14 Color variable, with at least two basic morphs: 1) light background with dark spots and blotches, and 2) dark or black background with small spots or rings. For positive identification, skull is needed (Fig. 38): nasal-premaxillary contact mostly < 3 mm; upper premolar teeth of adults mostly set obliquely; shape of posterior margin of jugal in adults mostly angular; bullae angular, not greatly inflated. Virtually the only small seal south of Alaska (except young elephant seals). **HARBOR SEAL**

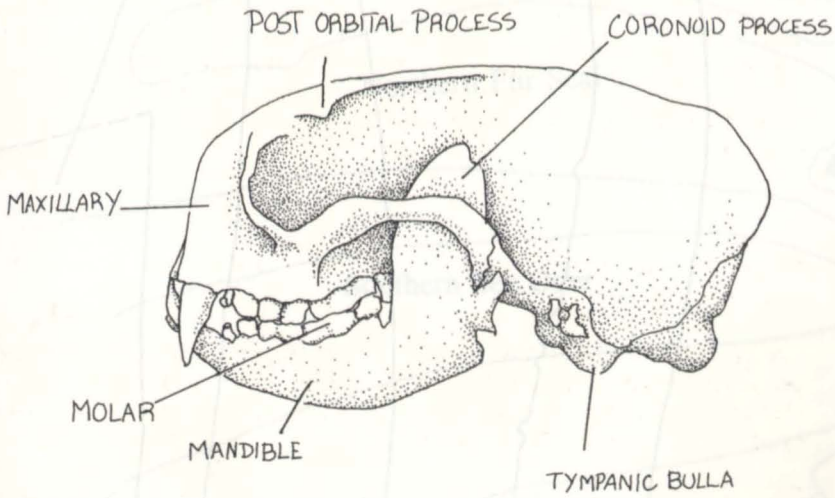
- 14 Background color pale silvery with darker steel-gray "saddle" on dorsal surface of nose, head, and body; color usually broken by small, fine rings or blotches, superimposed on dappling of oval to oblong spots, brownish gray to black and about 2×1 cm in diameter, whose long axis usually parallels that of the body. For positive identification the skull is needed (Fig. 38): nasal-premaxillary contact mostly more than 3 mm; upper premolar teeth of adults mostly set straight; shape of posterior margin of jugal in adults mostly rounded; bullae rounded, greatly inflated. **LARGHA SEAL**

NOTE: For subspecific identification of sea otters, characteristics of the skull must be considered (Fig. 39):

- 15 Coronoid process (highest lobe of lower jaw) not projecting backward, its posterior edge (as viewed from the side) straight or slightly convex; nasal length usually < 18 mm; skull viewed from above, with notch or suggestion of notch at narrowest part (between the eyes); molars rounded. Color very dark. **NORTHERN SEA OTTER**
- 15 Coronoid process projecting backward, its posterior edge concave; nasal length usually > 18 mm; skull without notch at narrowest part, the bones flaring smoothly to the front and back; molars flat and wide. Color usually medium brown.

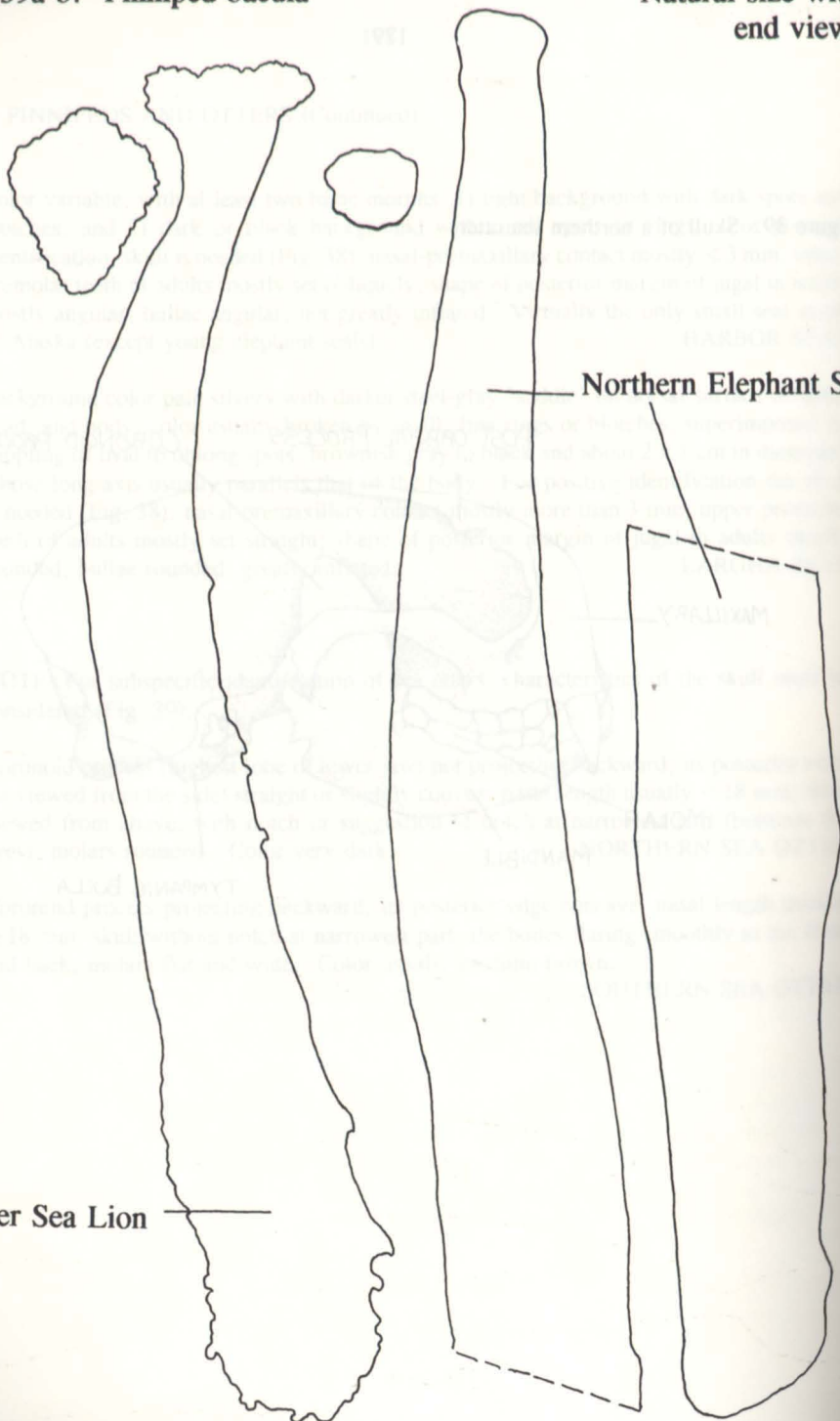
SOUTHERN SEA OTTER

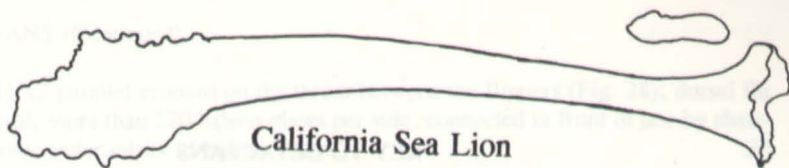
Figure 39. Skull of a northern sea otter.



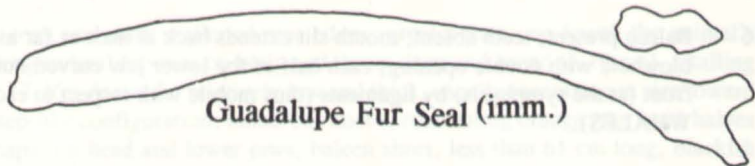
Steller Sea Lion

Northern Elephant Seal

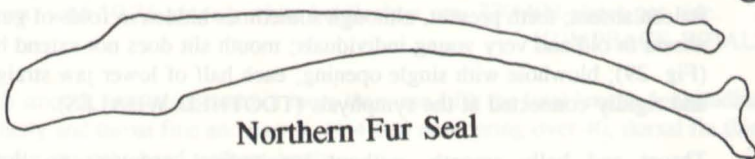




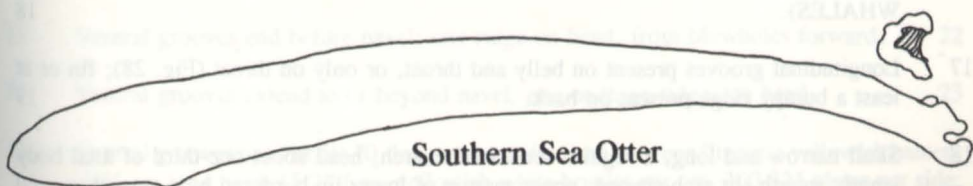
California Sea Lion



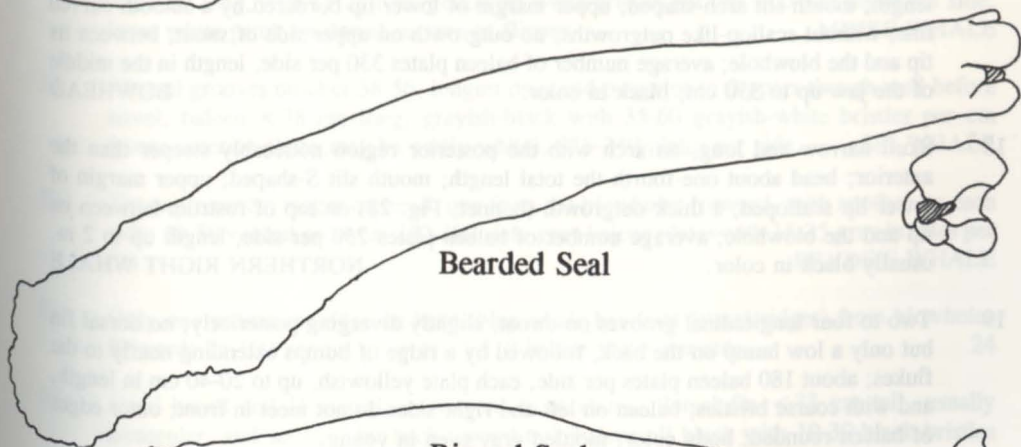
Guadalupe Fur Seal (imm.)



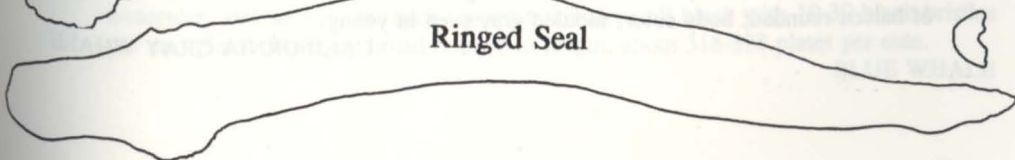
Northern Fur Seal



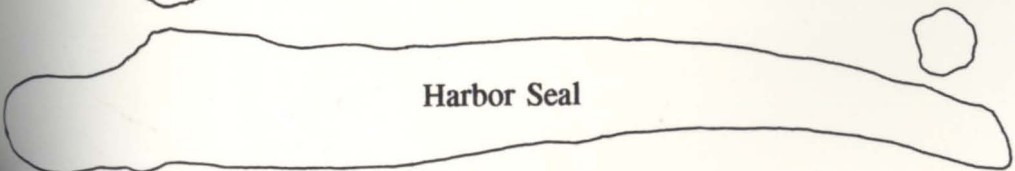
Southern Sea Otter



Bearded Seal



Ringed Seal



Harbor Seal

KEY TO CETACEANS

- 16 Baleen present; teeth absent; mouth slit extends back at least as far as the eyes (Fig. 28); blowhole with double opening; each half of the lower jaw curved outward, connected in front (at the symphysis) by ligaments (thus mobile with respect to each other) (BALEEN WHALES). 17
- 16' Baleen absent; teeth present, although sometimes hidden in folds of gums and sometimes absent in old and very young individuals; mouth slit does not extend back as far as eyes (Fig. 29); blowhole with single opening; each half of lower jaw straight or bent inward and rigidly connected at the symphysis (TOOTHED WHALES). 25
- 17 Throat and belly smooth, without longitudinal grooves; no dorsal fin (RIGHT WHALES). 18
- 17' Longitudinal grooves present on belly and throat, or only on throat (Fig. 28); fin or at least a bumpy ridge present on back. 19
- 18 Skull narrow and long, a regular semicircular arch; head about one-third of total body length; mouth slit arch-shaped; upper margin of lower lip bordered by a smooth curved line, without scallop-like outgrowths; no outgrowth on upper side of snout, between its tip and the blowhole; average number of baleen plates 330 per side, length in the middle of the jaw up to 350 cm, black in color. BOWHEAD
- 18' Skull narrow and long, an arch with the posterior region noticeably steeper than the anterior; head about one-fourth the total length; mouth slit S-shaped; upper margin of lower lip scalloped; a thick outgrowth (bonnet, Fig. 28) on top of rostrum between its tip and the blowhole; average number of baleen plates 250 per side, length up to 2 m, usually black in color. NORTHERN RIGHT WHALE
- 19 Two to four longitudinal grooves on throat, slightly diverging posteriorly; no dorsal fin but only a low hump on the back, followed by a ridge of bumps extending nearly to the flukes; about 180 baleen plates per side, each plate yellowish, up to 20-40 cm in length, and with coarse bristles; baleen on left and right sides do not meet in front; outer edges of baleen rounded; body color, mottled gray even in young. CALIFORNIA GRAY WHALE

KEY TO CETACEANS (Continued)

- 19 More than 11-12 parallel grooves on the throat between the flippers (Fig. 28); dorsal fin well developed; more than 220 baleen plates per side, connected in front of jaw by shaft-like formations; outer edges of baleen sharp. 20
- 20 Flippers very long and with scalloped rear edges, greater than one-fourth the animal's total length; longitudinal grooves on belly and throat deep and broad (8-10 cm), totalling < 40 (usually 12-36); dorsal fin relatively low and thick, usually increasing in size toward the rear in a step-like configuration; numerous knobs, resembling orange (the fruit) halves in size and shape, on head and lower jaws; baleen short, less than 61 cm long, blackish to olive brown, with 10-35 grayish white bristles per cm, 270-400 plates per side.
HUMBACK WHALE
- 20 Flippers with smooth rear edges and not more than one-fifth the total length; longitudinal grooves on belly and throat fine and narrow (1-4 cm) numbering over 40; dorsal fin thin, slender, usually smooth; head without knobs. 21
- 21 Ventral grooves end before navel; one ridge on head, from blowholes forward. 22
- 21 Ventral grooves extend to or beyond navel; one or three ridges on head. 23
- 22 Ventral grooves number 50-70, longest ones often end between flippers; yellowish baleen, < 21 cm long, with 15-25 fine, yellowish-white bristles per cm, 300-325 plates per side; large white patch on dorsal surface of flipper. MINKE WHALE
- 22 Ventral grooves number 38-56, longest ones end posterior to flippers though well before navel; baleen < 78 cm long, grayish-black with 35-60 grayish-white bristles per cm (some anterior plates may be partly white), 318-340 plates per side. SEI WHALE
- 23 Three prominent ridges on head: one from the blowholes forward, with another on each side; 40-50 ventral grooves; 250-300 slate-gray baleen plates with 15-35 gray bristles per cm. BRYDE'S WHALE
- 23 Only one prominent ridge on head (blue whale has faint lateral ridges) from blowholes forward; 55-100 ventral grooves; > 310 baleen plates per side. 24
- 24 Head broad and U-shaped, as viewed from above; dorsal fin < 33 cm tall, usually triangular, and set very far back toward tail; baleen all black with 10-30 black bristles per cm, plates extremely broad relative to length, about 318-328 plates per side.
BLUE WHALE

KEY TO CETACEANS (Continued)

- 24' Head broad at back of mouth slit but snout is sharply pointed; dorsal fin to 61 cm high, curved slightly to moderately backward, and located slightly more than one-third forward from tail to rostrum; color of lower jaw is asymmetrical: the right side white, the left dark gray; one-fifth to one-third of baleen on right front ivory to yellowish-white, remainder grayish streaked with yellowish-white, plates have 10-15 gray or white bristles per cm and are narrow relative to length, about 356-365 plates per side.

FIN WHALE

- 25 Mouth situated entirely on extreme lower side of head, upper part of head extending well past tip of lower jaw; lower jaw much narrower than upper; convexity of the blowhole directed sideways and not straight to the rear, OR blowhole S-shaped. 26

- 25' Mouth situated at the fore-end of the rostrum; lower jaw extending as far or almost as far as front of the head, almost as wide as the rostrum; convexity of the blowhole directed straight to the rear. 28

- 26 Head very large, up to one-third the animal's total length, squarish in front, and sides very flat in the anterior part; blowhole S-shaped, located at the left front corner of the head; dorsal fin low, shaped as a hump or series of humps on the posterior half of the body; no teeth in upper jaw, tooth sockets present which act as receptacles for teeth of lower jaw when mouth closed. SPERM WHALE

- 26' Head about one-fifth the animal's total length, evenly rounded in front; blowhole horseshoe-shaped, situated on top of head, slightly displaced to the left and approximately even with the eyes; dorsal fin slender. 27

- 27 No creases on throat; dorsal fin small, located well behind midpoint of total body length; 12-16 teeth (rarely 10-11) in each side of lower jaw.

PYGMY SPERM WHALE

- 27' Inconspicuous creases on throat; dorsal fin tall and slender, located near the middle of the back (the anterior portion of the fin is near the midpoint of the body); 8-11 (rarely 13) sharp teeth in each side of lower jaw, rarely 1-3 teeth in each side of upper jaw.

DWARF SPERM WHALE

- 28 Conspicuous grooves on outer surface of throat, converging anteriorly; median notch in rear edge of tail flukes absent or inconspicuous; teeth very few and only in lower jaw, sometimes not visible. 29

KEY TO CETACEANS (Continued)

- 28' No conspicuous grooves on throat; deep median notch on rear margin of flukes; teeth usually numerous in upper and lower jaws, but in exceptional cases upper teeth are absent (Risso's dolphin) or number only one or two (narwhal). 31
- 29 Rostrum straight, long and slender, transverse width in the middle of the rostrum not more than one-seventh of rostrum length; one tooth on each side of lower jaw, erupted or hidden beneath the gum, far to the rear of the fore-end of the lower jaw, usually behind the tip of the rostrum with mouth closed; teeth laterally compressed, their anterior-posterior axis at least twice as long as transverse axis.

BEAKED WHALE (a cleaned skull needed for species identification; e.g. Fig. 40)

- 29' Rostrum not as above, width in middle not less than one-sixth of its length; one or two teeth in each side of the lower jaw (erupted or hidden beneath the gum), usually set at tip and in front of the upper jaw tip when mouth closed; teeth nearly round in cross section, if flattened, then anterior-posterior axis not more than 1.5 times the transverse axis. 30
- 30 Two teeth in each side of lower jaw; well developed grooves in front of eyes (preorbital), sharply defining rear margin of rostrum; rostrum in dorsal view narrow at base, the length being 2.0-2.2 times the width between the grooves; forehead not concave in front of blowhole; distinct beak and bulging forehead present; beak flattened dorso-ventrally, its margins parallel to one another. BOTTLENOSE WHALE
- 30' One tooth in each side of lower jaw; preorbital grooves not sharply defined; rostrum in dorsal view relatively shorter and wider than above, forming more closely an equilateral triangle; forehead slightly concave in front of blowhole, increasing in concavity with increasing size; no distinct beak or bulging forehead; beak not flattened dorso-ventrally, its margins not parallel. CUVIER'S (GOOSE-BEAKED) WHALE
- 31 No dorsal fin, but rather a low, narrow ridge near midpoint of back; one pair of teeth in upper jaw, in females (see Fig. 41 for sex identification), usually concealed beneath gums and sometimes a tusk; in males, a tusk up to 3 m in length; OR up to 44 teeth (8-11 pairs above and below), the upper teeth markedly inclined forward and usually having an egg-shaped cavity on the lower edge of the crown (produced from friction with the anterior lower teeth). 32
- 31' Dorsal fin present or absent (if absent, then total tooth count not less than 60); lower jaws always with teeth. 33

Figure 40. Skull of a small toothed whale (porpoise).

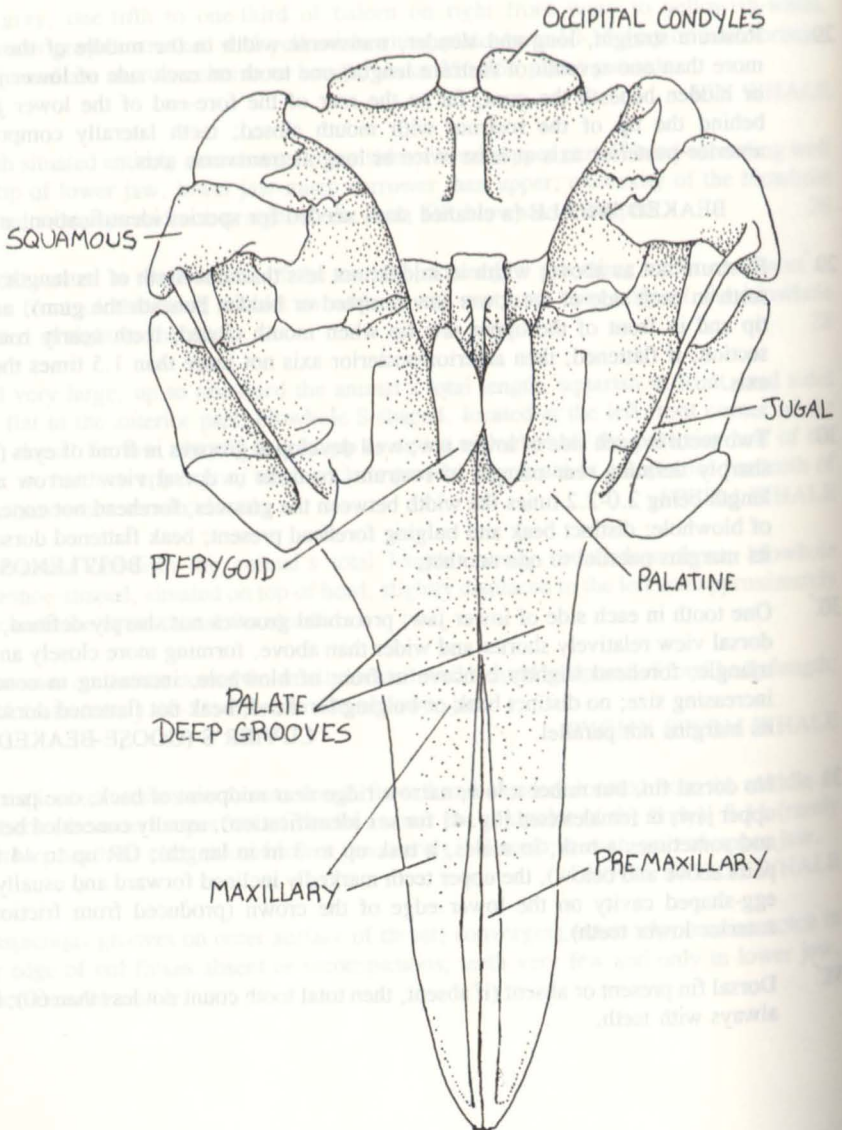
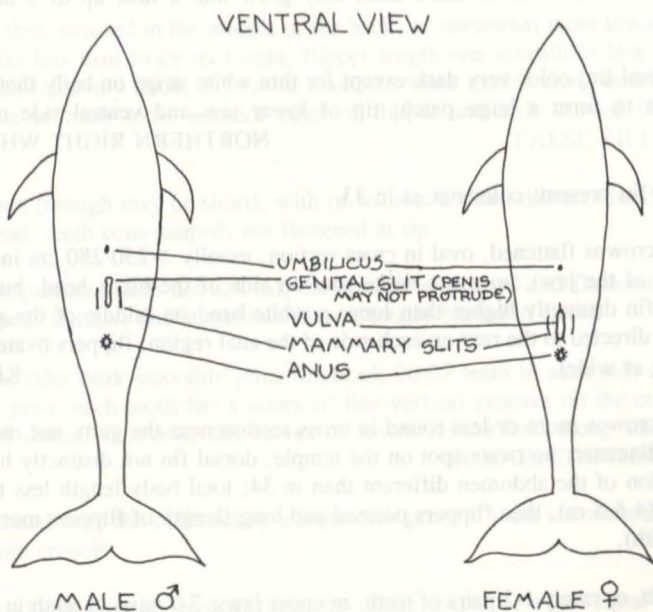


Figure 41. Some morphological differences between male and female cetaceans.



KEY TO CETACEANS (Continued)

- 32 Same color all over (adults white or yellowish; young 150-200 cm long, slate gray or brownish); 32-44 teeth (8-11 pairs above and below), teeth set widely apart, inclined markedly forward in upper jaw; distinct constriction demarcates head. BELUGA
- 32' Adults spotted, but young (1 m in length) are not (shale-blue all over); no teeth in lower jaw, but one pair in upper jaw, usually not showing in females; in males and sometimes females one or both of these teeth may grow into a tusk up to 3 m in length; high Arctic. NARWHAL
- 33 No dorsal fin; color very dark except for thin white stripe on belly that widens between flippers to form a large patch; tip of lower jaw and ventral side of flukes usually white. NORTHERN RIGHT WHALE DOLPHIN
- 33' Dorsal fin present; color not as in 33. 34
- 34 Tooth crowns flattened, oval in cross section, usually >250-280 cm in diameter (in the middle of the jaw); an ovate white spot on side of the black head, but if absent, then dorsal fin distinctly higher than long; a white band on middle of the abdomen, with a branch directed to the rear on each side of the anal region; flippers ovate (less than twice as long as wide). KILLER WHALE
- 34' Tooth crowns more or less round in cross section near the gum, not more than 2.5-2.8 cm in diameter; no ovate spot on the temple; dorsal fin not distinctly higher than long; coloration of the abdomen different than in 34; total body length less than 4 m; OR if longer (4-6.5 m), then flippers pointed and long (length of flippers more than 2.5 times the width). 35
- 35 No teeth, or rarely 1-2 pairs of teeth, in upper jaws; 2-7 pairs of teeth in the anterior part of the lower jaw; forehead almost vertical, with a central longitudinal crease. RISSO'S DOLPHIN
- 35' More than 6 pairs of teeth each in upper and lower jaws; forehead usually rising gradually from rostrum, but if steep then no crease in forehead. 36
- 36 Head rounded, beakless, the forehead rising almost vertically from rostrum; not more than 8-13 pairs of teeth in each jaw; total length 650 cm. 37
- 36' Beak well defined, or if absent, the forehead low, not rising vertically from the rostrum; >15 pairs of teeth in each jaw; total length up to 400 cm. 38

KEY TO CETACEANS (Continued)

- 37 Dorsal fin low and thick, located $\frac{1}{3}$ the distance from rostrum to tail; length of dorsal fin two or more times its height; flipper length equal to or greater than one-sixth of body length; teeth relatively slender, not more than 1.3 cm in diameter, located in the anterior portion of the jaw (thus the length from the first to last tooth is markedly shorter than the length of the jaw); mouth directed downwards, at an angle of $30-45^\circ$ to the horizontal body axis; prominent hump on anterior edge of flipper.

SHORT-FINNED PILOT WHALE

- 37 Dorsal fin thin, situated in the middle of the back, or somewhat more towards the head; length of fin less than twice its height; flipper length one-seventh or less of total body length; teeth relatively thick, 2.7 cm in diameter; teeth extend along entire jaw; mouth less oblique to body axis; anterior edge of flipper smoothly curved (no prominent hump).

FALSE KILLER WHALE

- 38 Beak distinct (though may be short), with or without a sharp demarcation between beak and forehead; teeth cone-shaped, not flattened at tip. 39

- 38 Beak inconspicuous; teeth not conical, the crowns broadened and flattened laterally, or chisel-shaped, slender, and sometimes almost totally buried in gums. 40

- 39 The long slender beak smoothly joins forehead; 20-27 teeth in each side of both upper and lower jaws; each tooth has a series of fine vertical grooves on the crown (may be difficult to detect, if worn); the halves of lower jaws joined along one-fourth their length.

ROUGH-TOOTHED DOLPHIN

- 39 Beak separated from the forehead by a transverse groove; teeth are without grooves and have smooth crowns. 41

- 40 Pointed head and moderately stout body; dorsal fin shaped as a low equal-sided triangle somewhat lower than long at the base (but not less than half as high as long); fore and rear edges of the fin forming equal angles with the back; a large white area extending high into the flanks, sharply delineated from the dusky dorsal and anterior areas; a distinct, humped ridge runs from the flukes up the middle of the back; teeth chisel-shaped, very slender, not exceeding 1 mm in thickness, more or less embedded in gums; vertebrae number about 98.

DALL'S PORPOISE

KEY TO CETACEANS (Continued)

- 40 Blunt rostrum and short thick body; dorsal fin usually triangular but posterior margin nearly perpendicular to the back, while anterior margin not so steep; dark above, light below; no sharply delimited white area on flanks; no prominent ridge running forward from flukes; teeth usually with broad crown (flattened laterally, spatula-shaped), not buried in gums; diameter of teeth in the middle of the jaw > 1 mm at the gum line; vertebrae number about 68. HARBOR PORPOISE

- 41 Beak long, the distance from its tip to the eye center is less than 2.6 times the beak length; beak length is greater than one-twentieth the total body length. 42

- 41 Beak moderate to short, the distance from beak tip to the eye center greater than 2.7 times the beak length; beak length is less than one twenty-fifth the total body length. 43

- 42 A dark streak running from the flipper base toward chin; roof of mouth (palate; Fig. 40) with two longitudinal grooves.

SHORT-BEAKED AND LONG-BEAKED COMMON DOLPHIN
(see Species Accounts, Page 195)

- 42 A dark streak (often indistinct) running from flipper to corner of mouth area or to base of eye, and frequently circling eye (variable); roof of mouth without grooves; up to 270 cm in total length.

SPOTTED and STRIPED DOLPHINS (*Stenella* spp.; skull needed for species identification)

- 43 Each side of upper jaw has 19-26 teeth, 19-25 teeth on each side of lower jaw; diameter of a tooth from the middle of the jaw 6-11 mm; beak not white, up to 7 cm long in adults; no ridge on back from flukes forward; gray or dark blackish, belly lighter.

BOTTLENOSE DOLPHIN

- 43 Each side of upper and lower jaws has 27-40 teeth; diameter of a tooth from center of jaw 4-5 mm; if teeth fewer (up to 22 per side of jaw) and their diameter is greater (up to 6-7 mm), then beak white; beak length up to 5 cm in adults; sides of body flattened just before flukes with a distinct ridge along top; black back, striking light gray sides and white belly. PACIFIC WHITE-SIDED DOLPHIN

MAMMAL SPECIES ACCOUNTS

Information on range and the maximum sizes of the animals are given in the following species accounts. Such information was excluded from the keys because unless considered carefully, it can be very misleading. If the animal you are keying out is say, 10 m long, then you can rule out those species in which maximum length is much less than that. You can not rule out animals that attain a greater maximum length because, and often quite likely, you may be trying to identify a juvenile or subadult. In some instances we can offer information on minimum lengths (at birth). Another difficulty with size in marine mammals, especially pinnipeds, is that males and females can be greatly different in size. Information on size comes from Scheffer (1958) and Leatherwood et al. (1972).

SEA LIONS AND FUR SEALS (OTARIIDAE)

STELLER (or NORTHERN) SEA LION *Eumetopias jubatus* (choices 7' and 8', pg. 175) occurs from central California north to the Bering Sea. Males reach a length of 3.2 m and a weight of 1000 kg; females reach 230 cm and 275 kg. At birth, pups are about a meter long and weight about 18 kg.

CALIFORNIA SEA LION *Zalophus californianus* (choices 7 and 8, pg. 175) occurs from Cabo San Lucas north to British Columbia; females occasionally move north of central California. Males reach a length of 240 cm and a weight of 280 kg; females reach 180 cm and 95 kg. At birth pups are less than a meter long.

GUADALUPE FUR SEAL *Arctocephalus townsendi* (choice 9, pg. 175) occurs principally off central Baja California and less so north to southern California. Individuals have occasionally been sighted north to central California. Rare. Its population is exceedingly small compared to those of the sea lions or the northern fur seal. Males reach a length of 260 cm and a weight of 300 kg; females reach 180 cm and 125 kg. Pups are less than a meter long.

NORTHERN FUR SEAL *Callorhinus ursinus* (choice 9', pg. 175) occurs from the Bering Sea south to southern California. Pelagic species; not common in waters over the continental shelf. Males reach a length of 220 cm and a weight of 280 kg; females reach 150 cm and 65 kg. Pups are less than a meter long.

WALRUS (ODOBENIDAE)

WALRUS *Odobenus rosmarus* (choice 4, pg. 171) occurs principally in the Bering Sea although rarely individuals have been reported as far south as British Columbia. Males reach a length of 370 cm and a weight of 1300 kg; females reach 300 cm and 850 kg. Pups are 100 cm long.

TRUE SEALS (PHOCIDAE)

BEARDED SEAL *Erignathus barbatus* (choice 11, pg. 176) occurs around sea ice, and moves with the ice seasonally from the Arctic Ocean to the southern Bering Sea. Males reach a length of 290 cm and a weight of 400 kg; females reach 260 cm in length.

RINGED SEAL *Phoca hispida* (choice 13, pg. 177) is associated with sea ice, and seasonally moves to the southeastern Bering Sea from the Arctic Ocean. Males and females reach a length of 140 cm and a weight of 90 kg. Newborn pups are less than 75 cm long.

RIBBON SEAL *Phoca fasciata* (choice 12', pg. 177) like the previous two species, is associated with sea ice. It moves seasonally with the ice in the Bering Sea, its usual southern limit being the Alaska Peninsula. On very rare occasions, they have been encountered south of Alaska, as far south, in fact, as California. Males and females reach a length of 170 cm and a weight of 100 kg and 80 kg respectively.

HARBOR SEAL *Phoca vitulina* (choice 14, pg. 178) is widely distributed in coastal waters from the southeastern Bering Sea to central Baja California. Posses spotted, leopard-like pelage. Males reach a length of 180 cm and a weight of 120 kg; females reach 160 cm and 110 kg. Newborn pups are about 75 cm long.

LARGHA or SPOTTED SEAL *Phoca largha* (choice 14', pg. 178) is the Asian counterpart of the harbor seal and occurs in North American waters largely only in the vicinity of the Bering Strait. Specimens are also known from the vicinity of the Pribilof Islands. This species averages slightly larger than the harbor seal, but there is great overlap in size.

NORTHERN ELEPHANT SEAL *Mirounga angustirostris* (choice 10', pg. 176) occurs from central Baja California north to British Columbia, and rarely to southeast Alaska. Males reach a length of 650 cm and a weight of 3700 kg; females reach 360 cm and 910 kg. Newborn pups are about 130 cm in length.

SEA OTTERS (MUSTELIDAE)

NORTHERN and SOUTHERN SEA OTTER *Enhydra l. lutris* and *Enhydra l. nereis* (choices 15 and 15', pp. 178-179). The northern sea otter occurs from the Aleutians south to Washington and the southern sea otter occurs from Baja California north to northern California. The northern form reaches a maximum size of about 100 cm and the southern form reaches 140 cm in length.

RIGHT WHALES (BALAENIDAE)

BOWHEAD *Balaena mysticetus* (choice 18, pg. 182) occurs in association with sea ice in the Arctic Ocean and Bering Sea. It reaches a maximum length of 21 m.

NORTHERN RIGHT WHALE *Eubalaena glacialis* (choice 18', pg. 182) occurs from western Alaska, and perhaps the Bering Sea, south to central Baja California. It reaches a maximum length of 17 m.

GRAY WHALES (ESCHRICHTIIDAE)

CALIFORNIA GRAY WHALE *Eschrichtius robustus* (choice 19, pg. 182) migrates from Baja California in winter to as far north as the Bering Sea in spring and summer. Maximum length is 15 m.

RORQUALS (BALAENOPTERIDAE)

HUMPBACK *Megaptera novaeangliae* (choice 20, pg. 183) occurs through out the area covered by this manual, migrating south in the fall to tropical seas and north in the spring to the Arctic. Maximum length is 16 m.

MINKE WHALE *Balaenoptera acutorostrata* (choice 22, pg. 183) occurs from the Bering Sea to Baja California and is apparently in the latter area during the winter. Maximum length is 10 m.

SEI WHALE *Balaenoptera borealis* (choice 22', pg. 183) spends its summers from California north to the Gulf of Alaska, and at other times occurs farther south. Maximum length is 19 m.

BRYDE'S WHALE *Balaenoptera edeni* (choice 23, pg. 183) occurs from central Baja California south. Maximum length is 15 m.

BLUE WHALE *Balaenoptera musculus* (choice 24, pg. 183) occurs from the Aleutian Islands to central California in summer, and from Baja California to the south in winter. Maximum length is 26 m.

FIN WHALE *Balaenoptera physalus* (choice 24', pg. 184) occurs from the central Bering Sea to Baja California. Maximum length is 22 m.

SPERM WHALES (PHYSETERIDAE)

SPERM WHALE *Physeter macrocephalus* (choice 26, pg. 184) occurs off California and Baja California during the winter and during the summer occurs from California to as far north as the Bering Sea. Maximum length is 18 m.

PYGMY SPERM WHALE *Kogia breviceps* (choice 27, pg. 184) occurs in this area largely off California and Baja California, but also occasionally as far north as Washington. Maximum length is about 400 cm.

DWARF SPERM WHALE *Kogia simus* (choice 27', pg. 184) occurs from Baja California north to central California. Maximum length is slightly more than 300 cm.

BEAKED WHALES (ZIPHIIDAE)

BEAKED WHALES *Mesoplodon* spp. (choice 29, pg. 185). At least five species are possible and although their ranges (poorly known) may not be entirely overlapping, one or the other could occur anywhere in the area covered by this manual. They reach a length of about 650 cm.

BOTTLENOSE WHALE *Berardius bairdii* (choice 30, pg. 185) occur from the Bering Sea to at least southern California. They reach a length of about 14 m.

CUVIER'S or GOOSE-BEAKED WHALE *Ziphius cavirostris* (choice 30', pg. 185) occurs from the Bering Sea to Baja California. Maximum length is about 10 m.

MONODONTS (MONODONTIDAE)

BELUGA *Delphinapterus leucas* (choice 32, pg. 188) occurs from the Arctic Ocean south to southeast Alaska. Maximum length is 600 cm.

NARWHAL *Monodon monoceros* (choice 32', pg. 188) occurs in the Arctic Ocean and on very rare occasions has been reported in the vicinity of the Bering Strait. Maximum length is 600 cm.

DOLPHINS AND PORPOISES (DELPHINIDAE)

NORTHERN RIGHT WHALE DOLPHIN *Lissodelphis borealis* (choice 33, pg. 188) occurs from southeast Alaska to as far south as southern California. Maximum length is about 250 cm.

KILLER WHALE *Orcinus orca* (choice 34, pg. 188) occurs throughout the region covered in this manual. Maximum length up to 10 m.

RISSE'S DOLPHIN *Grampus griseus* (choice 35, pg. 188) occurs largely from California south to the tropics, but has been reported as far north as British Columbia. Maximum length is 400 cm.

SHORT-FINNED PILOT WHALE *Globicephala macrorhynchus* (choice 37, pg. 189) occurs largely from central California south, although on occasion it has been reported as far north as the Alaska Peninsula. Maximum length is about 650 cm.

FALSE KILLER WHALE *Pseudorca crassidens* (choice 37', pg. 189) occurs from Washington south. Maximum length is about 550 cm.

ROUGH-TOOTHED DOLPHIN *Steno bredanensis* (choice 39, pg. 189) is most likely to be found in waters off southern Baja California, although specimens have occurred rarely as far north as central California. Maximum length is about 250 cm.

SHORT-BEAKED and LONG-BEAKED COMMON DOLPHIN *Delphinus spp.* (choice 42, pg. 190) occurs normally in warmer waters, from central California south, but on rare occasions has been reported as far north as British Columbia. Some authorities consider there to be two closely related species, one an inshore (long-beaked -- eye patch sharply contrasts with surrounding thoracic patch in adult *D. delphis*) and the other an offshore (short-beaked) species, identified on the basis of beak length: *D. delphis* is considered the short-beaked and *D. capensis* the long-beaked species (Heyning and Perrin 1991). Maximum length is about 250 cm.

SPOTTED and STRIPED DOLPHINS *Stenella spp.* (choice 42', pg. 190) occur from central Baja California south but on rare occasions have been reported as far north as southern California. Maximum length is about 300 cm.

BOTTLENOSE DOLPHIN *Tursiops truncatus* (choice 43, pg. 190) occurs largely from southern California south, but on rare occasions has been reported as far north as Oregon. Maximum length is about 350 cm.

PACIFIC WHITE-SIDED DOLPHIN *Lagenorhynchus obliquidens* (choice 43', pg. 190) occurs from southeast Alaska to central Baja California. Maximum length is about 250 cm.

DALL'S PORPOISE *Phocoenoides dalli* (choice 40, pg. 189) occurs principally from the Aleutian Islands to southern California, and infrequently as far south as central Baja California. Maximum length is about 250 cm.

HARBOR PORPOISE *Phocoena phocoena* (choice 40', pg. 190) occurs from the Bering Strait to southern California. Most common beached cetacean on Pacific Coast. Maximum length is about 170 cm.

BOOKS AND ARTICLES WITH ADDITIONAL INFORMATION ON MARINE MAMMALS

- Allen, J.A. 1880. History of North American Pinnipeds. Government Printing Office, Miscellaneous Publication No. 12. Washington, D.C. 785 pp.
- Barnard, K.H. 1954. A Guide Book to South African Whales and Dolphins. South African Museum, Guide No. 4. Cape Town. 33 pp.
- Bee, J.W., and E.R. Hall. 1956. Mammals of northern Alaska, on the Arctic Slope. University of Kansas, Museum of Natural History, Miscellaneous Publications No. 8. 309 pp.
- Bodkin, J.L., and R.J. Jameson. 1991. Patterns of seabird and marine mammal carcass deposition along the central California coast, 1980-1986. *Canadian Journal of Zoology* 69:1149-1155.
- Caskin, D.E. 1968. The New Zealand Cetacea. *Fisheries Research Bulletin* No. 1 (new series). 92 pp.
- Davis, J., and W.L. Lidicker. 1975. The taxonomic status of the southern sea otter. *California Academy of Sciences, Proceedings* 11(14):429-437.
- Daugherty, A.E. 1979. Marine Mammals of California. Second Edition. California Department of Fish and Game, Sacramento. 61 pp.
- Fay, F.H., L.M. Shultz and R.A. Dietrich. 1979. A Field Manual for Postmortem Examination of Alaskan Marine Mammals. Institute of Marine Science and Institute of Arctic Biology, University of Alaska, Fairbanks. 51 pp.
- Fowler, C.W. 1987. Marine debris and northern fur seals: a case study. *Marine Pollution Bulletin* 18(6B):326-335.
- Fraser, F.C., and H.W. Parker. 1966. Guide for the Identification and Reporting of Stranded Whales, Dolphins, Porpoises and Turtles on the British Coasts. British Museum (Natural History), London. 42 pp.
- Geraci, J.R. and D.J. St. Aubin (eds.). 1979. Biology of marine mammals: insights through strandings. Marine Mammal Commission Report No. MMC-77/13. U.S. Department of Commerce, National Technical Information Service, Document 293890, Washington D.C. 343 pp.
- Geraci, J.R., and V.J. Lounsbury. 1993. Marine Mammals Ashore: a Field Guide for Strandings. Sea Grant Publication, Texas A & M University, College Station. 305 pp.
- Griner, J.A. 1987. Autopsy procedure for pinnipeds and small cetaceans, Appendix G in Hawaiian Monk Seal Die-off Response Plan: a Workshop Report (W.G. Gilmartin, ed.). Department of Commerce, National Marine Fisheries Service, Southwest Fisheries Center, Administrative Report H 87-19. 11 pp.
- Hansen, L.J. 1983. The Cooperative Marine Mammal Salvage Program: Report on Strandings of Dead Animals in 1981. Department of Commerce, National Marine Fisheries Service, Southwest Fisheries Center, Administrative Report LJ-83-03. 20 pp.

- Hare, M.P., and J.M. Mead. 1987. Handbook for Determination of Adverse Human-Marine Mammal Interactions from Necropsies. Department of Commerce, National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Processed Report 87-06. 35 pp.
- Harmer, S.F. 1909. Guide to the Whales, Porpoises, and Dolphins Exhibited in the Department of Zoology, British Museum (Natural History), London. 47 pp.
- Hershkovitz, P. 1966. Catalog of Living Whales. U.S. National Museum, Bulletin 246. 259 pp.
- Heyning, J.E., and W.F. Perrin. 1991. Re-examination of two forms of common dolphins (genus *Delphinus*) from the eastern North Pacific: evidence for two species. Department of commerce, National Marine Fisheries Service, Southwest Fisheries Center, Administrative Report LJ-91-28. 53 pp.
- Kellogg, R. 1940. Whales, giants of the sea. National Geographic Magazine 77: 35-90.
- Kenyon, K.W., and V.B. Scheffer. 1955. The seals, sea-lions, and sea otter of the Pacific coast. Department of the Interior, Fish and Wildlife Service, Circular 32. 34 pp.
- Kenyon, K.W. 1969. The sea otter in the eastern Pacific Ocean. North American Fauna, No. 68. 352 pp.
- Leatherwood, S., and R.R. Reeves. 1983. The Sierra Club Handbook of Whales and Dolphins. Sierra Club Books, Berkeley. 302 pp.
- Leatherwood, S., W.E. Evans and D.W. Rice. 1972. The Whales, Dolphins and Porpoises of the Eastern North Pacific, A Guide to Their Identification in the Water. Naval Undersea Center, Technical Publication 282. 175 pp.
- Leatherwood, S., D.K. Caldwell, and H.E. Winn. 1976. Whales, Dolphins, and Porpoises of the Western North Atlantic, a Guide to Their Identification. National Oceanic and Atmospheric Administration, Technical Report, National Marine Fisheries Service, Circular 396. 176 pp.
- Mansfield, A.W. 1964. Seals of Arctic and Eastern Canada. Fisheries Research Board, Canada, Bulletin No. 137. 30 pp.
- Marine Mammal Commission. 1976. Marine Mammal Names. Marine Mammal Commission, Washington, D.C. 8 pp.
- Mitchell, E.D. 1973. The status of the world's whales. Nature Canada 2:9-25.
- Norris, K.S. (ed.) 1961. Standardized methods for measuring and recording data on the smaller cetaceans. Journal of Mammalogy 42:471-476.
- Norris, K.S. 1966. Whales, Dolphins and Porpoises. University of California Press, Berkeley. 789 pp.
- Orr, R.T., and R.C. Helm. 1989. Marine Mammals of California. Revised Edition. University of California Press, Berkeley. 93 pp.
- Peterson, R.S., C.L. Hubbs, R.L. Gentry and R.L. DeLong. 1968. The Guadalupe fur seal; habitat, behavior, population size, and field identification. Journal of Mammalogy 49:665-675.

- Perrin, W.F. 1972. Color patterns of spinner porpoises (*Stenella* cf. *S. longirostris*) of the eastern Pacific and Hawaii, with comments on delphinid pigmentation. U.S. Fishery Bulletin 70:983-1003.
- Pike, G.C. 1956. Guide to the Whales, Porpoises and Dolphins of the Northeast Pacific and Arctic Waters of Canada and Alaska. Fisheries Research Board, Canada. Circular 32. 14 pp.
- Pike, G.C. and L.B. McCaskie. 1969. Marine mammals of British Columbia. Fisheries Research Board, Canada. Bulletin 171. 54 pp.
- Reeves, R.R., B.S. Stewart and S. Leatherwood. 1992. The Sierra Club Handbook of Seals and Sirenians. Sierra Club Books, Berkeley. 359 pp.
- Repenning, C.A., R.S. Peterson and C.L. Hubbs. 1969. Classification of fur seals. Sixth Annual Conf. Biol. Sonar and Diving Mammals. Stanford Research Institute, Menlo Park. 8 pp.
- Repenning, C.A., R.S. Peterson and C.L. Hubbs. 1971. Contributions to the systematics of the southern fur seals, with particular reference to the Juan Fernandez and Guadalupe species in Antarctic Pinnipedia. Antarctic Research Series 18:1-34. American Geophysical Union, Washington, D.C.
- Reynolds, J.E., and D.K. Odell. 1991. Marine Mammal Strandings in the United States. Department of Commerce, National Oceanic and Atmospheric Administration, Technical Report NMFS 98. 157 pp.
- Rice, D.W. 1967. Cetaceans, pp. 291-324 in Recent Mammals of the World. Ronald Press, New York.
- Rice, D.W., and V.B. Scheffer. 1968. A list of the marine mammals of the world. Department of the Interior, Fish and Wildlife Service, Special Scientific Report, Fisheries 579. 16 pp.
- Riedman, M. 1990. The Pinnipeds: Seals, Sea Lions and Walruses. University of California Press, Berkeley. 439 pp.
- Robinette, H.R., and H.J. Stains. 1970. Comparative study of the calcanea of the Pinnipedia. Journal of Mammalogy 51:527-541.
- Roest, A.I. 1973. Subspecies of the sea otter, *Enhydra lutris*. Los Angeles County Museum of Natural History, Contributions to Science, No. 252. 17 pp.
- Ronald, K., and A.W. Mansfield. 1975. Biology of the seal. Rappaport P.-v. Reun. Cons. int. Exploration de Mer 169. 557 pp.
- Sergeant, D.E. 1961. Whales and dolphins of the Canadian east coast. Fisheries Research Board, Canada, Circular 7. 17 pp.
- Sergeant, D.E. and H.D. Fisher. 1957. The smaller cetacea of eastern Canadian waters. Journal of the Fisheries Research Board, Canada 14:83-115.
- Scheffer, V.B. 1958. Seals, Sea lions, and Walruses, a Review of the Pinnipedia. Stanford University Press, Stanford. 179 pp.
- Scheffer, V.B. (ed.) 1967. Committee on marine mammals. Standard measurements of seals. Journal of Mammalogy 48:459-462.
- Scheffer, V.B., and J.W. Slipp. 1948. The whales and dolphins of Washington state with a key to the cetaceans of the west coast of North America. American Midland Naturalist 39:257-337.

- Scheffer, V.B., and F. Wilke. 1950. Validity of the subspecies of *Enhydra lutris nereis*, the southern sea otter. *Journal of the Washington Academy of Science* 40:269-272.
- Shaughnessy, P.D., and F.H. Fay. 1977. A review of the taxonomy and nomenclature of North Pacific harbour seals. *Journal of Zoology* (London) 182:385-419.
- Starks, E.C. 1922. Records of the capture of fur seals on land in California. *California Fish and Game* 8:155-160.
- Tomilin, A.G. 1957. Mammals of the U.S.S.R. and adjacent countries, Vol. IX. Israel Program for Scientific Translations, Jerusalem. 717 pp.
- True, F.W. 1889. Contributions to the natural history of the cetaceans, a review of the family Delphinidae. U.S. National Museum, Bulletin 36. 192 pp.
- Walker, E.P. 1964. Mammals of the World. Johns Hopkins University Press, Baltimore.
- Wilkinson, D. 1991. Report to Assistant Administrator for Fisheries. Program Review of the Marine Mammal Stranding Network. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Washington D.C. 171 pp.
- Winchell, J.M. 1982. A field manual for small cetacean dissection. College of the Atlantic, Bar Harbor ME. 70 pp.

SEA TURTLES

Five species of sea turtles are the only marine reptile regularly found in our area. Most are common from southern California southward and into the Gulf of California. They occasionally range north into the Gulf of Alaska, but northern records are usually during anomalously warm-water periods. Sea turtles are usually found above the continental shelf and along coastlines, in bays, and estuaries; they rarely come ashore except to lay eggs. All species are protected, but there is still some poaching and an artisinal fishery for them in Mexican waters.

Causes of death in most dead shore-cast or stranded sea turtles are from drowning in nets, boat collisions, ingestion of plastics (especially bags), or from thermal (cold) shock. Females have a short tail with the cloaca (urogenital opening) near the base; males have a longer tail with the cloaca toward the tail's tip. All specimens from the western United States should be carefully identified and reported, and if possible, voucher specimens should be collected by authorized personnel. Minimally, take a series of photos.

GLOSSARY OF TERMS

Beak - the bony mouth parts; the tip of the upper beak may be hook-like (one or two hooks).

Carapace - synonym for the top portion of the shell (as in turtle shell).

Plastron - that portion of the shell on the under side of the turtle.

Plate - see Scute.

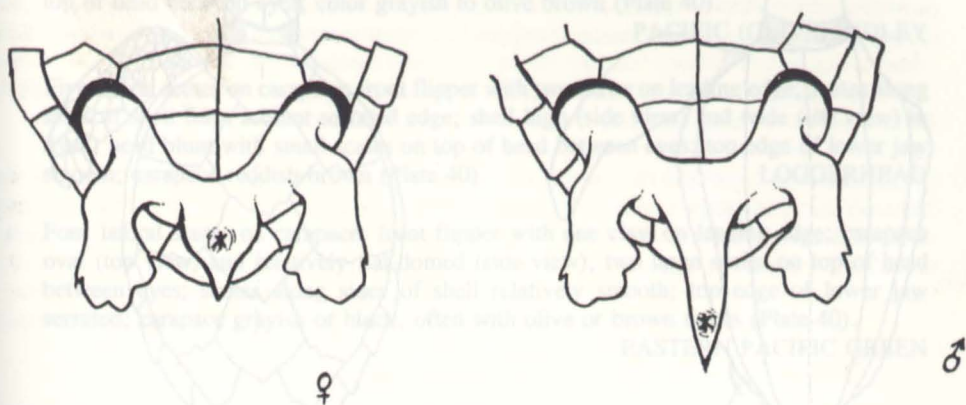
Scales - individual disks that comprise the skin of a reptile; similar to the scales on the feet of birds (Fig. 13).

Scute - the individual plates that interlock to form the shell; those along the edge of the are usually much smaller than those in the center (Fig. 42, Plate 40).

Shell - see Carapace and Plastron.

Cloaca - urogenital opening of a reptile (or bird) (Fig. 42).

Figure 42. Position of the cloaca in male and female turtles.



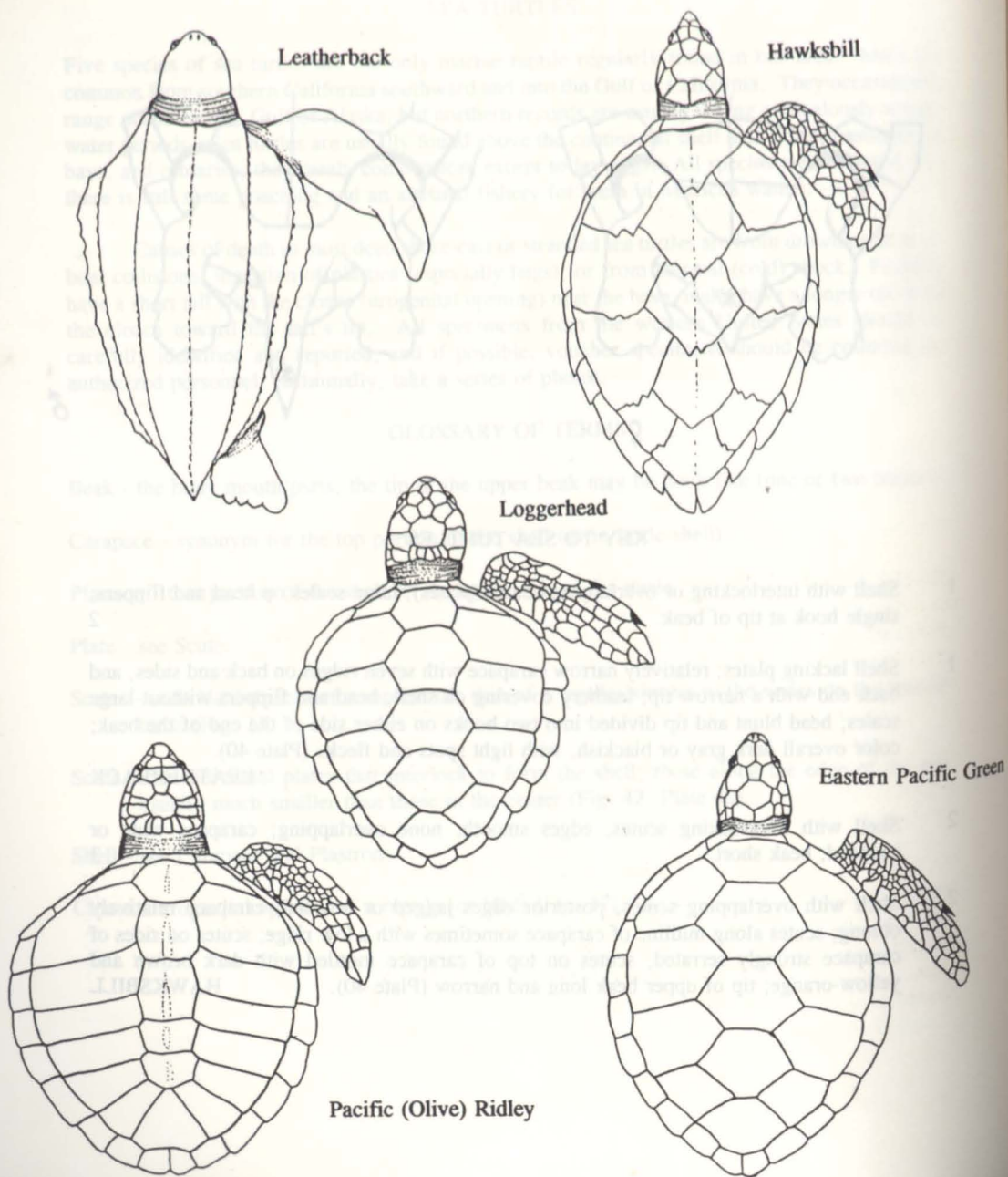
KEY TO SEA TURTLES

- 1 Shell with interlocking or overlapping scutes (plates); large scales on head and flippers; single hook at tip of beak. 2
- 1' Shell lacking plates; relatively narrow carapace with seven ridges on back and sides, and back end with a narrow tip; leathery covering on shell, head and flippers without large scales; head blunt and tip divided into two hooks on either side of the end of the beak; color overall dark gray or blackish, with light spots and flecks (Plate 40). 2
- 2 Shell with interlocking scutes, edges smooth, none overlapping; carapace wide or rounded; beak short. 3
- 2' Shell with overlapping scutes, posterior edges jagged or notched; carapace relatively oblong; scutes along midline of carapace sometimes with a low ridge; scutes on sides of carapace strongly serrated, scutes on top of carapace mottled with dark brown and yellow-orange; tip of upper beak long and narrow (Plate 40). 3

LEATHERBACK

HAWKSBILL

Plate 40. Marine turtles of the eastern North Pacific Ocean.



KEY TO TURTLES (Continued)

- 3 Four or five lateral scutes on carapace. 4
- 3' Six to eight lateral scutes on carapace; scutes along midline of carapace with low ridge in center; shell wider (top view) and higher (side view) at front; two pairs of scales on top of head between eyes; color grayish to olive brown (Plate 40).
PACIFIC (OLIVE) RIDLEY
- 4 Five lateral scutes on carapace; front flipper with two claws on leading edge; scutes along sides of shell form a blunt serrated edge; shell high (side view) and wide (top view) in front; head blunt with small scales on top of head between eyes; top edge of lower jaw smooth; carapace reddish-brown (Plate 40).
LOGGERHEAD
- 4' Four lateral scutes on carapace; front flipper with one claw on leading edge; carapace oval (top view) and relatively flat-domed (side view); two large scales on top of head between eyes; scutes along sides of shell relatively smooth; top edge of lower jaw serrated; carapace grayish or black, often with olive or brown tinges (Plate 40).
EASTERN PACIFIC GREEN

SEA TURTLE SPECIES ACCOUNTS

LEATHERBACK TURTLE *Dermochelys coriacea* (choice 1', pg. 201) is the largest species of sea turtle; carapace length may exceed 240 cm and weight may reach 730 kg. This is the only species of sea turtle that has a leathery shell with serrated longitudinal ridges; the shell lacks scutes or plates. They also lack large scales on the head and flippers. They range in color from a slaty gray to black, with light flecks and spots. Their head is blunt and the tip of the beak is divided into two hooks on either side, forming a W pattern.

Found world wide in warmer waters, they range along the entire western coast of North America to the Gulf of Alaska. This is the species most frequently found stranded on beaches north of central California.

HAWKSBILL TURTLE *Eretmochelys imbricata* (choice 2', pg. 201) is characterized by the overlapping scutes that have a jagged posterior edge, a mottled brown and yellow-orange color, and an elongated upper beak. The scutes along the side of the shell have pointed ends, giving the shell a serrated margin; sometimes the scutes along the midline of the carapace have a low ridge. Carapace lengths reach to nearly 100 cm and weight reaches nearly 130 kg. This is the species used for tortoise shell jewelry.

The Hawksbill is found worldwide in warm oceans, and along our coast from southern California southward.

PACIFIC or OLIVE RIDLEY TURTLE *Lepidochelys olivacea* (choice 3', pg. 203) is the only species of sea turtle that regularly has more than five lateral scutes on the shell; most others have four or five. Scutes along the midline of the carapace may have low ridges, and there are two pairs of scales on top of the head between the eyes. The shell is olive to dark gray. It is a relatively small sea turtle that reaches carapace lengths of over 90 cm and weights to over 45 kg.

It occurs worldwide in warm waters, but in our area has been recorded from the Gulf of Alaska south to Central America; it is most common in the southern portion of its range.

LOGGERHEAD TURTLE *Caretta caretta* (choice 4, pg. 203) is characterized by having two claws on the front flipper (most other species have a single claw), five lateral scutes (rarely more) on the shell, a wide, blunt head, and a reddish-brown carapace. Carapace length reaches to over 200 cm and weights exceeds 400 kg.

Found worldwide, it ranges on our coast from the Gulf of Alaska southward, but is most frequently seen off western Baja California.

EASTERN PACIFIC GREEN TURTLE *Chelonia agassizii* (*Chelonia mydas agassizii* by some authors) (choice 4', pg. 203) has a smooth, rather flat carapace that ranges in color from dark olive and brown to gray and black. It has only four lateral scutes on the carapace, and there is a single pair of large scales between the eyes on the top of the head. The upper edge of the lower jaw is serrated. Carapace length can exceed 150 cm and weights can reach over 90 kg.

It occurs from southern Alaska to southern Chile, but usually found from Baja California to Peru.

BOOKS AND ARTICLES WITH ADDITIONAL INFORMATION ON SEA TURTLES

- Marquez, M.R. 1990. FAO Species Catalogue. Vol. 11: Sea Turtles of the World. An Annotated and Illustrated Catalogue of Sea Turtle Species Known to Date. Fisheries Synopsis 125(11):1-81. United Nations, FAO Fisheries, Rome.
- Pritchard, P.C. et al. 1983. Sea Turtle Manual of Research and Conservation Techniques. Western Atlantic Turtle Symposium. IOC/ARIBE. 95 pp.
- Stebbins, R.C. 1985. A Field Guide to Western Reptiles and Amphibians. The Peterson Field Guide Series. Houghton Mifflin Company, Boston. 336 pp.

SHARKS AND RAYS

Several species of sharks and rays are occasionally found stranded or cast ashore on our beaches. Most of these are either remains from fishermen or are animals cast ashore after storms. Sharks and rays differ from most other fishes by having five to seven gill openings (not one as in bony fishes), rigid fins with rays inside, and a body composed of tiny, hard, tooth-like scales not thin, overlapping bony scales as in bony fishes). Large sharks are sometimes mistaken for small dolphins, but dolphins have smooth skin, a blowhole on the top, and completely lack gills. Male sharks have claspers, or rod-like extensions of the surface of the pelvic fins, but females do not.

Detailed here are morphological characteristics that can be used to identify species of sharks and rays found dead on beaches of the Pacific Coast of North America. Of over 40 species of sharks and over 20 species of skates and rays found in the northeast Pacific, the species in this key are the most likely to be encountered. Figures showing general body and (in some cases) tooth shape are also included, but remember that these drawings depict animals as they appear when alive and swimming. Dead on the beach, they become less robust in body proportions although lengths will not be affected.

GLOSSARY OF TERMS

Anal fin - a single fin on the underside of the body (Fig. 29).

Caudal fin - the tail fin; in many species, it includes an upper lobe and lower lobe (Fig. 29) but in some only an upper lobe.

Caudal keel - a ridge on each side of the tail stock.

Claspers - modified posterior ventral (pelvic) fins in male sharks (see Ventral fins).

Denticles - small projections on the teeth of certain sharks, located at the gum line.

Dorsal fin - fins that project upward from the back; the first dorsal fin is forward of the second dorsal fin (Fig. 29). Some species have but one dorsal fin.

Gill slits - vertical slits behind the head; these allow the flow of water over the shark's or ray's gills (Fig. 29).

Spine, barb or stinger - in certain rays, a hard needle-like projection embedded in the tail, usually somewhat forward of the tail tip; in dogfish and hornsharks, the spine may be anterior of the dorsal fins.

Spiracle - a small hole on the side of the head and behind the eye.

Ventral fins - pairs of fins on the lower side of a shark; the pair forward (pectoral fins) are usually much larger than the posterior pair (pelvic fins) (Fig. 29). In male sharks the posterior pair are modified into long, spear-like projections.

KEYS TO ABUNDANT COASTAL SHARKS AND RAYS

- 1 Body relatively elongate, fish-like, not flattened; pectoral fins not wide. 8
- 1' Body flat; pectoral fins wide. 2
- 2 Mouth on underside of body; pectoral fins joined with head. 3
- 2' Body very flat; mouth at end of snout, not on underside; pectoral fins not joined to head, separated by a space; two dorsal fins, caudal fin on end of tail; skin texture pebble-like or like very coarse sandpaper; grayish, brownish, or olive above, whitish below; teeth sharp and narrow (Plate 41a). **PACIFIC ANGEL SHARK**
- 3 Two dorsal fins; no sharp barb (stinger) on base of tail. 4
- 3' No dorsal fins, sharp barb (stinger) on base of tail. 6
- 4 Caudal fin at end of tail. 5
- 4' No caudal fin at end of tail, tip of tail pointed; no sharp barb at base of tail; pectoral fins wide, forming a diamond-shape; front edge of pectoral fins sometimes concave; sometimes a translucent or semi-transparent area at front of snout; small prickles or thorns on upper side of the pectoral fins, usually a row of blunt thorns along center of back and tail; brownish or grayish above, lighter below; teeth small, interlocking, usually flat or with short points (Plate 41a). **SKATES**
- 5 Caudal fin at end of tail; body very long; snout long and pointed, with translucent or semi-transparent area at end of snout; one row of blunt spines along back and tail; body light or medium brownish to olive, lighter below; teeth interlocking, low, and pebble-like (Plate 41a). **GUITARFISHES** (see Species Accounts, Page 215)
- 5' Two dorsal fins, caudal fin at end of tail; body relatively short; snout short and blunt; pectoral fins round; three rows of sharp spines along back and side of body and tail; body brownish to olive, lighter below (Plate 41a). **THORNBACK** (see Species Accounts, Page 215)

KEY TO SHARKS (Continued)

- 6 Tail pointed with a long tip; pectoral fins pointed at tips. 7

- 6' Caudal fin on end of tail; pectoral fins rounded, nearly circular; color light to dark brown, lighter below, sometimes with vague markings (Plate 41a).

ROUND STINGRAY

- 7 Tail long, whip-like, lacking a caudal fin; blunt head extending beyond pectoral fins; eyes on sides of the head; flat ridge on lower front of head; pectoral fins triangular, pointed at ends; body thick; color dark grayish to blue-black, lighter below; teeth in form of wide crushing plates (Plate 41a).

CALIFORNIA BAT RAY (see Species Accounts, Page 216)

- 7' Tail short; pectoral fins very wide, pointed at ends; snout flat, rounded, sometimes with a small point; eyes on top of head; brownish or olive above, lighter below (Plate 41a).

CALIFORNIA BUTTERFLY RAY (see Species Accounts, Page 216)

- 8 No spine in front of dorsal fins. 10

- 8' Spine in front of each dorsal fin. 9

- 9 Nose pointed; no anal fin; body silvery to dark gray with white spots; teeth not serrated but overlap to form a saw-like edge (Plate 41b). SPINY DOGFISH

- 9' Nose blunt and pig-like; ridges over eyes; anal fin present; pectoral fin wider than in 9; body brown with black spots; front teeth like blunt spikes, rear teeth flat (Plate 41b).

HORN SHARK

- 10 Two dorsal fins present. 11

- 10' One dorsal fin present on rear of body; head broad and blunt; seven gill slits; body gray with black spotting and mottling; lower teeth comb-like (Plate 41b).

SEVENGILL SHARK (see Species Accounts, Page 217)

- 11 Upper lobe of caudal fin shorter than body length. 12

- 11' Upper lobe of caudal fin as long as body; body dark gray above, white below; pectoral fin pointed; teeth small and triangular, no serrations (Plate 41b).

THRESHER SHARK (see Species Accounts, Page 217)

- 12 Snout not wide and flattened, not hammer-like. 14

KEY TO SHARKS (Continued)

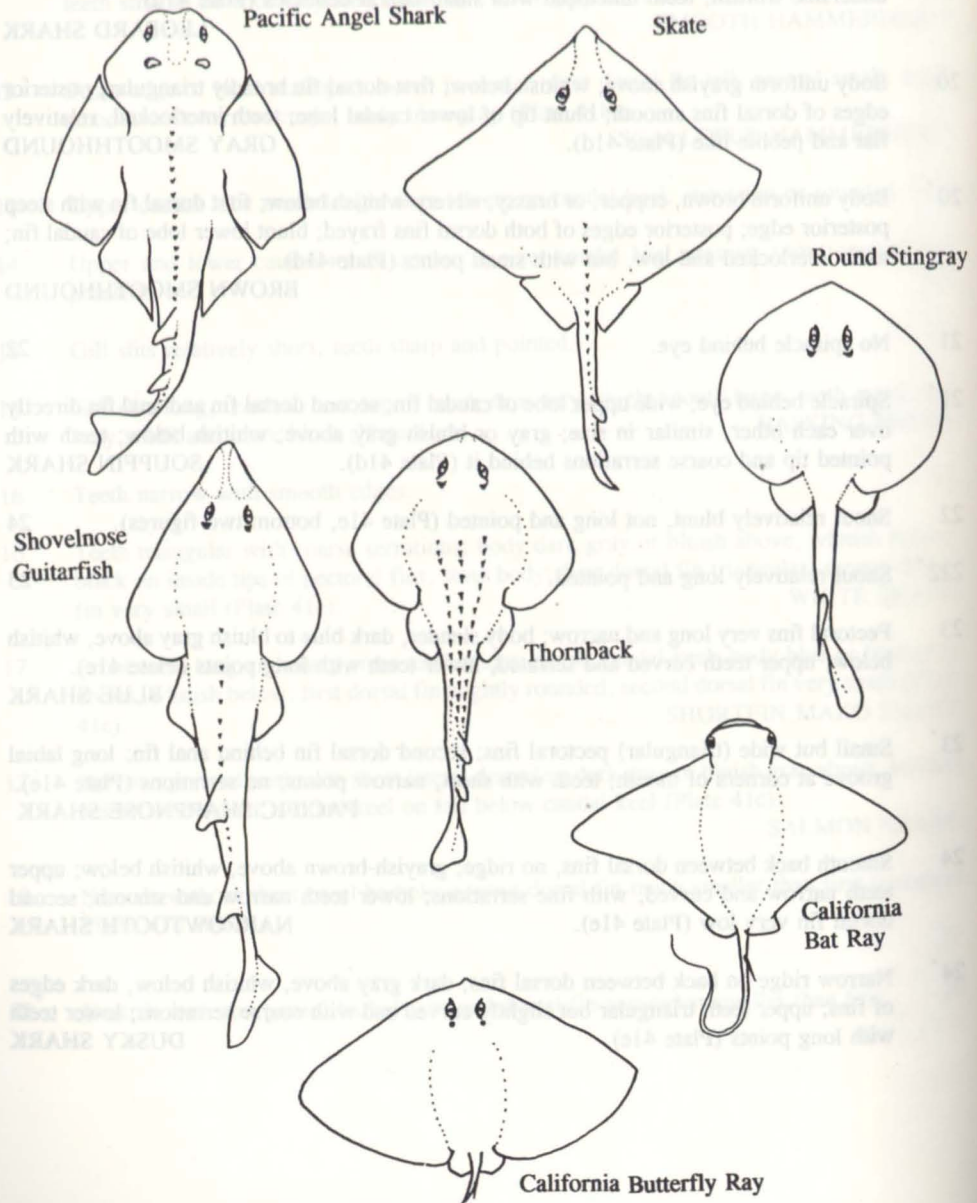
- 12 Snout wide and flattened, hammer-like head with eyes on ends. 13
- 13 Front edge of head arched in center, no notch; first dorsal fin tall, second very small; teeth smooth or with very fine serrations; body grayish (Plate 41b).
SMOOTH HAMMERHEAD
- 13 Front edge of head scalloped, notch in center; first dorsal fin tall, second small; teeth smooth with narrow cusps; body blue-gray (Plate 41b).
SCALLOPED HAMMERHEAD
- 14 Upper caudal lobe much longer than lower; no caudal keel; snout flat or rounded. 18
- 14 Upper and lower caudal lobes similar in size; caudal keel present; snout conical and pointed. 15
- 15 Gill slits relatively short; teeth sharp and pointed. 16
- 15 Gill slits long, reach to near top of head; skin very rough; mouth large, teeth many, but very small and more blunt (Plate 41c).
BASKING SHARK
- 16 Teeth narrow with smooth edges. 17
- 16 Teeth triangular with coarse serrations; body dark gray or bluish above, whitish below; black on inside tips of pectoral fins; stout body; first dorsal fin triangular, second dorsal fin very small (Plate 41c).
WHITE SHARK
- 17 Front teeth long and sharp, rear teeth wider; single caudal keel; body blue or blue-gray above, whitish below; first dorsal fin slightly rounded, second dorsal fin very small (Plate 41c).
SHORTFIN MAKO SHARK
- 17 Narrow, pointed teeth with short lateral denticles; dark gray or bluish gray above, whitish below; body stout; second keel on tail below caudal keel (Plate 41c).
SALMON SHARK
- 18 Nostrils without short nasal barbels; second dorsal fin much smaller than first (compare Plates 41d and 41e). 21
- 18 Nostrils with short nasal barbels; second dorsal fin somewhat smaller than first. 19

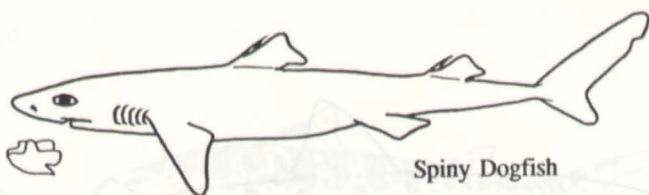
KEY TO SHARKS (Continued)

- 19 Body color uniform, no distinct markings. 20
- 19' Large brown saddles along back, black spots and bars on top and sides of body, underside whitish; teeth unicuspid with small lateral denticles (Plate 41d).
LEOPARD SHARK
- 20 Body uniform grayish above, whitish below; first dorsal fin broadly triangular; posterior edges of dorsal fins smooth; blunt tip of lower caudal lobe; teeth interlocked, relatively flat and pebble-like (Plate 41d).
GRAY SMOOTHHOUND
- 20' Body uniform brown, copper, or brassy, silvery-whitish below; first dorsal fin with steep posterior edge; posterior edges of both dorsal fins frayed; blunt lower lobe of caudal fin; teeth interlocked and low, but with small points (Plate 41d).
BROWN SMOOTHHOUND
- 21 No spiracle behind eye. 22
- 21' Spiracle behind eye; wide upper lobe of caudal fin; second dorsal fin and anal fin directly over each other, similar in size; gray or bluish gray above, whitish below; teeth with pointed tip and coarse serrations behind it (Plate 41d).
SOUPFIN SHARK
- 22 Snout relatively blunt, not long and pointed (Plate 41e, bottom two figures). 24
- 22' Snout relatively long and pointed. 23
- 23 Pectoral fins very long and narrow; body slender, dark blue to bluish gray above, whitish below; upper teeth curved and serrated, lower teeth with long points (Plate 41e).
BLUE SHARK
- 23' Small but wide (triangular) pectoral fins; second dorsal fin behind anal fin; long labial groove at corners of mouth; teeth with short, narrow points; no serrations (Plate 41e).
PACIFIC SHARPNose SHARK
- 24 Smooth back between dorsal fins, no ridge; grayish-brown above, whitish below; upper teeth narrow and curved, with fine serrations; lower teeth narrow and smooth; second dorsal fin very low (Plate 41e).
NARROWTOOTH SHARK
- 24' Narrow ridge on back between dorsal fins; dark gray above, whitish below, dark edges of fins; upper teeth triangular but slightly curved and with coarse serrations; lower teeth with long points (Plate 41e).
DUSKY SHARK

41a-e. Shark and ray species (showing tooth shape for selected species) most likely to be found on Pacific coast beaches.

Plate 41a

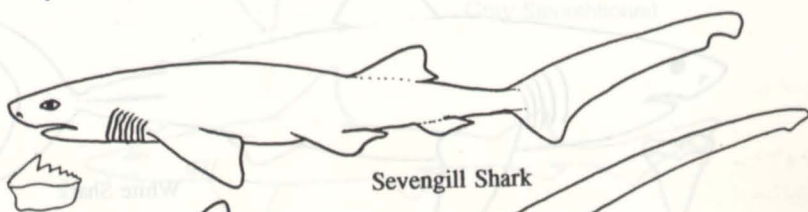




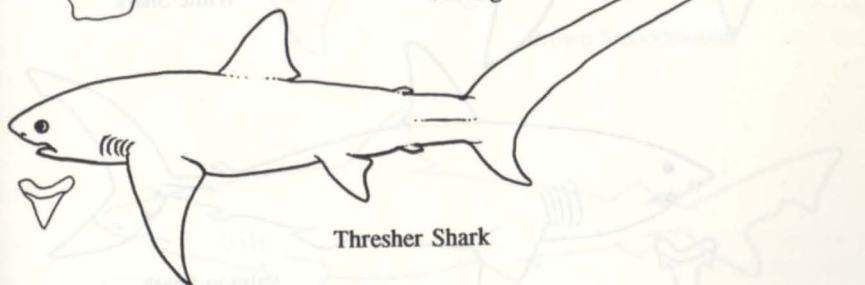
Spiny Dogfish



Horn Shark

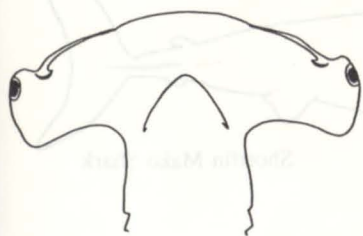


Sevengill Shark



Thresher Shark

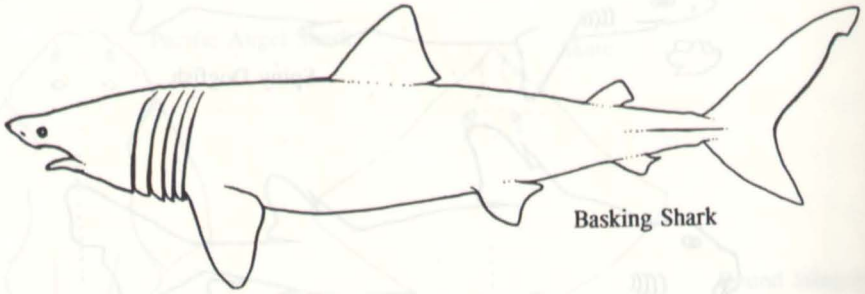
Smooth Hammerhead



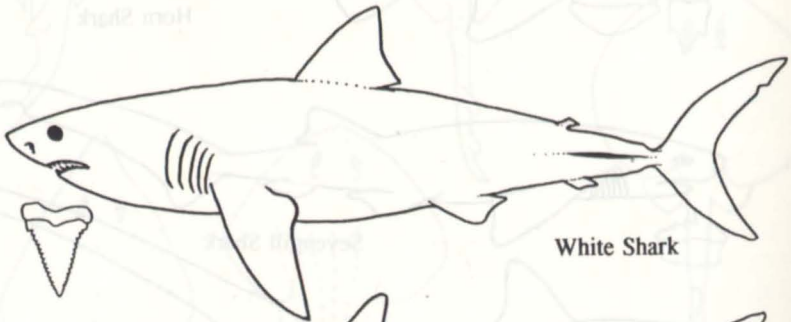
Scalloped Hammerhead



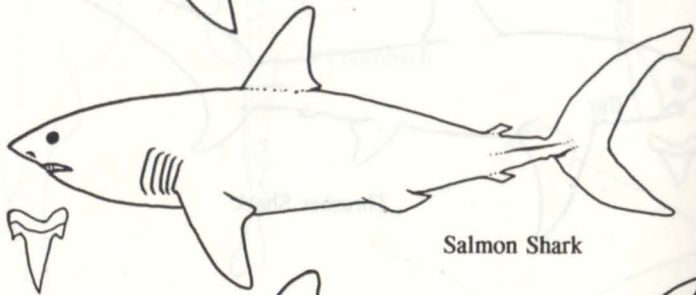
Plate 41c



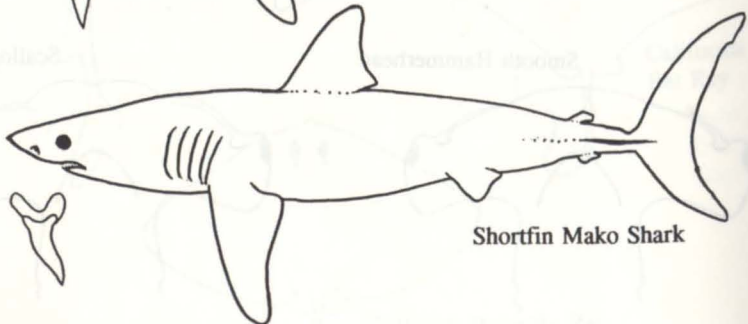
Basking Shark



White Shark



Salmon Shark



Shortfin Mako Shark

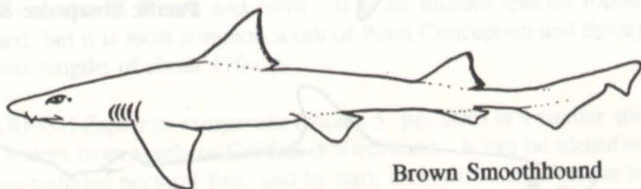
Plate 41d



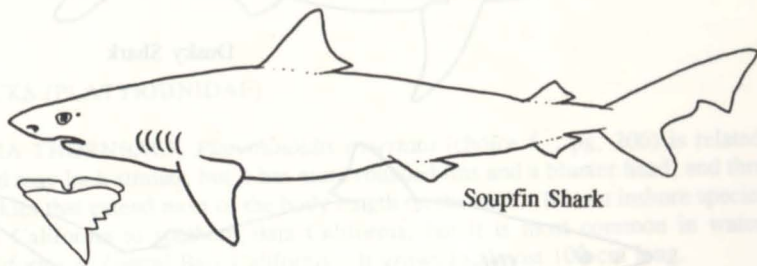
Leopard Shark



Gray Smoothhound

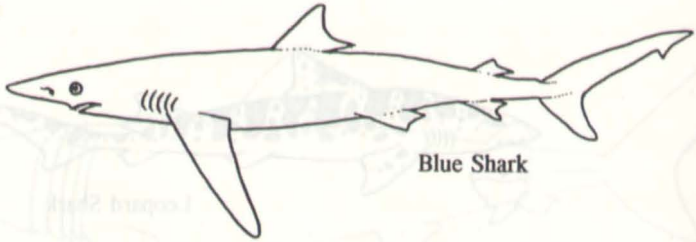


Brown Smoothhound

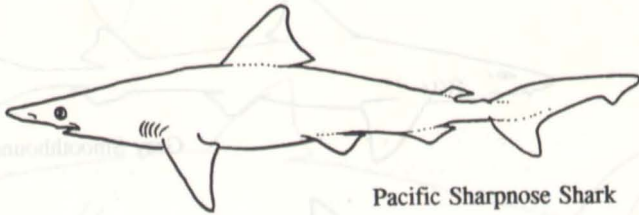


Soupfin Shark

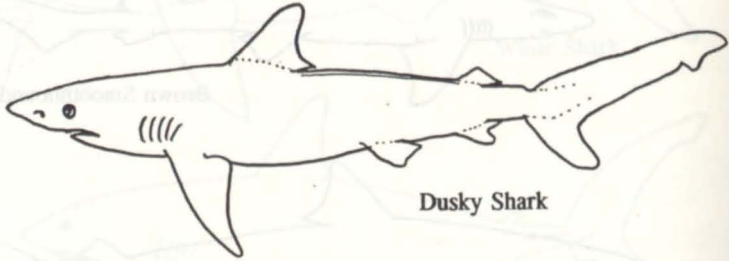
Plate 41c



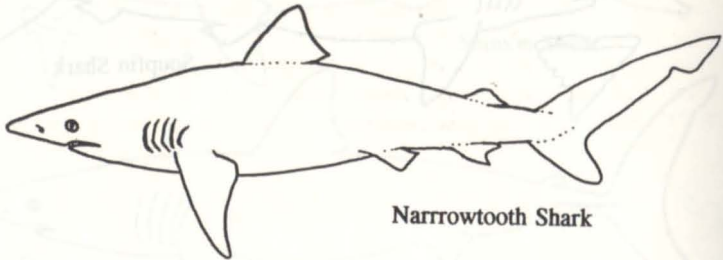
Blue Shark



Pacific Sharpnose Shark



Dusky Shark



Narrowtooth Shark

SHARK AND RAY SPECIES ACCOUNTS

SKATES (RAJIDAE)

Skates are usually diamond-shaped and have two dorsal fins but lack both a caudal fin and a stinger. They range from gray, brown, olive, with tinges of red, yellow or blue above, and are lighter below, and they often have small prickles on their dorsal side. The family is comprised of over a dozen bottom dwelling species that range from northern Alaska to lower Baja California.

BIG SKATE *Raja binoculata* (choice 4', pg. 206) is the most often encountered skate. They are found from near shore into deep water, Baja California to the Bering Sea, but they are more common inshore in the northern part of their range. They attain lengths of over 200 cm.

GUITARFISHES (RHINOBATIDAE)

SHOVELNOSE GUITARFISH *Rhinobatos productus* (choice 5, pg. 206) is long and almost shark-like. It has a long, pointed snout and a long tail with two dorsal fins and a tail. Its color ranges from various shades of brown and olive. It is an inshore species found from central California southward, but it is most common south of Point Conception and through the Gulf of California. It attains lengths of about 170 cm.

BANDED GUITARFISH *Zapteryx exasperata* (choice 5, pg. 206) is a similar species that may be encountered in waters from southern California southward. It can be identified by a shorter tail and snout, more rounded pectoral fins, and by dark crosswise bands on the back. Reaches 90 cm in length.

THORNBACKS (PLATYRHINIDAE)

CALIFORNIA THORNBACK *Platyrrhinoidis triseriata* (choice 5', pg. 206) is related to the guitarfish and may look similar, but it has more rounded fins and a blunter head, and three rows of sharp prickles that extend most of the body length on the back. It is an inshore species found from central California to southern Baja California, but it is most common in waters from southern California to central Baja California. It grows to almost 100 cm long.

TORPEDINIDAE

PACIFIC ELECTRIC RAY *Torpedo californica* has a flat body, two dorsal fins and a caudal fin similar to the guitarfish, but it lacks any dorsal spines, has a larger caudal fin, has a very flabby round body, and is gray with dark flecks. It is found from British Columbia to southern Baja California, but is most common south of Point Conception. It grows to about 150 cm. Danger: when alive, this ray can generate a shock of 80 volts.

ROUND STINGRAYS (UROLOPHIDAE)

ROUND STINGRAY *Urolophus halleri* (choice 6', pg. 207) has a nearly circular body, a tail with a sharp stinging barb and a caudal fin. It is brownish, sometimes with darker markings on top. This shallow-water species is found from northern California to Central America, but most common in southern California through the Gulf of California. It reaches lengths to nearly 60 cm.

Another species of inshore stingray, the DIAMOND STINGRAY *Dasyatis dipterura* (DASYATIDAE) is also found in this range, but differs by having a diamond-shaped body, and a longer, whip-like tail. Reaches 200 cm in length.

BAT RAYS (MYLIOBATIDIDAE)

CALIFORNIA BAT RAY *Myliobatis californica* (choice 7, pg. 207) is one of the few free-swimming rays. It has wing-like pectoral fins, a long, thin tail with a sharp stinging barb at its base, and a blunt head that extends over the front of the pectoral fins with a short bill at the front edge of the head. It is usually a dark gray, and the teeth are flat, thick crushing plates used to grind up hard-shelled invertebrates. It is frequently encountered inshore from Oregon through to the Gulf of California. It grows to 180 cm wide.

In southern Baja California and in the Gulf of California, the similar COWNOSE RAY *Rhinoptera steindachneri* may be encountered, but it can be distinguished by the large two-lobed bill that is divided in the middle. Reaches 150 cm in length.

BUTTERFLY RAYS (GYMNURIDAE)

CALIFORNIA BUTTERFLY RAY *Gymnura marmorata* (choice 7', pg. 207) is the only stingray with very wide pectoral fins, a short body, and a very short tail. It is brownish to olive, and sometimes speckled. This shallow water species is encountered from southern California southward, and into the Gulf of California. It reaches widths of 150 cm.

ANGEL SHARKS (SQUATINIDAE)

PACIFIC ANGEL SHARK *Squatina californica* (choice 2', pg. 206) is the only flat shark in this area. Often mistaken as a ray, but unlike rays, it has the pectoral fins separated from the head, a terminal mouth, and long, spike-like teeth. It occurs from southern Alaska southward through Baja California; common south of Point Conception. Attains lengths up to 150 cm.

DOGFISHES (SQUALIDAE)

SPINY DOGFISH *Squalus acanthias* (choice 9, pg. 207). Like others in this family it lacks an anal fin and has a spine in front of each dorsal fin. Found worldwide, but on our coast occurs from northern Alaska to Baja California; it is more common in the northern part of its range. Reaches 130 cm in length.

Similar is the PACIFIC SLEEPER SHARK *Somniosus pacificus*, a large, dark, heavy-bodied shark, but which has no dorsal spines. Its lower teeth are not comb-like. It is normally a shark of deep water from Japan to southern Baja California, but in Alaska and British Columbia it is sometimes found in shallow, near shore waters, even intertidally. Reaches 400 cm in length.

HORN SHARKS (HETERODONTIDAE)

HORN SHARK *Heterodontus francisci* (choice 9', pg. 207) has a bulky body with wide pectoral fins, ridges over the eyes, and a blunt, pig-like snout. It possesses dorsal spines and an anal fin. Teeth are short spikes in front, and wide, flat molar-like teeth in back. Found from Monterey Bay south through Baja California to the Gulf of California; common south of Point Conception. Reaches lengths to about 120 cm.

COW SHARKS (HEXANCHIDAE)

SEVENGILL SHARK *Notorynchus cepedianus* (choice 10', pg. 207) is different from all other sharks in that it has seven gill slits. Found worldwide, but in our area occurs from British Columbia south through Baja California. Most common in bays. It reaches about 250 cm in length.

SIXGILL SHARK *Hexanchus griseus* is similar in appearance, but is darker and has six gill slits. It lives in deeper offshore waters. Reaches 485 cm in length.

THRESHER SHARKS (ALOPIIDAE)

THRESHER SHARK *Alopias vulpinus* (choice 11', pg. 207) is easily identified by the extremely long tail, short snout, and small triangular teeth. Found in coastal and offshore waters worldwide, but in our area occurs from British Columbia south through Baja California; it is most common south of Washington. It reaches 600 cm in length, including tail.

BIGEYE THRESHER SHARK *Alopias superciliosus* is much rarer. It is found from southern California through Baja California into the Gulf, and can be distinguished by a huge eye, longer teeth, and a groove on either side of the head. Reaches 450 cm in length.

HAMMERHEAD SHARKS (SPHYRNIDAE)

SMOOTH HAMMERHEAD *Sphyrna zygaena* (choice 13, pg. 208) and SCALLOPED HAMMERHEAD *Sphyrna lewini* (choice 13', pg. 208) are characterized by their wide hammer-like heads. Found from southern California south through Baja California, they are most common in southern Baja California and the Gulf of California. Both live in coastal waters. Smooth hammerhead reaches about 400 cm and scalloped hammerhead reaches about 360 cm in length.

BONNETHEAD SHARK *Sphyrna tiburo* is small, has a broad shovel-like head, and is found along the coast of Baja California and occasionally into southern California. Reaches 110 cm in length.

BASKING SHARKS (CETORHINIDAE)

BASKING SHARK *Cetorhinus maximus* (choice 15', pg. 208). Occurs world wide, but in our area from the Gulf of Alaska to Baja California; it is most common off central California. A large shark, it has a huge mouth, tiny teeth, a conical snout, and rough skin. Reaches 10 m long. Large beach-cast specimens are sometimes misidentified as cetaceans or sea monsters.

Another large species of shark sometimes encountered off Baja California and in the Gulf of California is the WHALE SHARK *Rhincodon typus* (RHINCODONTIDAE). Unlike the basking shark, the whale shark has a wide, flat head without a conical snout, and it has a color pattern of light bars and spots on a dark background. Reaches 12 m in length.

MACKEREL SHARKS (LAMNIDAE).

SHORTFIN MAKO SHARK *Isurus oxyrinchus* (choice 17, pg. 208) has a relatively slender body and long, narrow, sharp front teeth. Occurs mostly offshore, but sometimes near the coast.

Found worldwide, but in our area from northern California southward through Baja California. Reaches up to about 350 cm in length.

SALMON SHARK *Lamna ditropis* (choice 17', pg. 208) is a heavy-bodied shark characterized by having a second keel on the sides of the caudal fin, and narrow teeth with a pair of lateral denticles. Otherwise looks generally similar to the white shark. Occurs from the Gulf of Alaska to southern California, but is more common in the northern part of its range. Reaches about 300 cm in length.

WHITE SHARK *Carcharodon carcharias* (choice 16', pg. 208) possesses triangular, heavily serrated teeth, without lateral denticles. The tips of the pectoral fins are black, and often has a black spot in the axis of the pectoral fin. It is dark gray to almost black above but white below. Found world wide, but on our coast occurs from the southern Gulf of Alaska southward to Baja California and into the Gulf of California; most common from northern California southward. Reaches about 650 cm in length. This species is protected in California waters, and all dead specimens should be reported.

SMOOTHBOUND SHARKS (TRIAKIDAE).

A group of mostly bottom-dwelling sharks, with spiracles behind the eyes and small nasal barbels.

LEOPARD SHARK *Triakis semifasciata* (choice 19', pg. 209) has conspicuous brown saddle-like blotches and spots. Occurs in shallow, coastal waters and bays from Oregon through Baja California, and into the Gulf of California. Attains lengths up to about 2.0 m.

GRAY SMOOTHBOUND *Mustelus californicus* (choice 20, pg. 209) and **BROWN SMOOTHBOUND** *Mustelus henlei* (choice 20', pg. 209) are common in bays, sloughs, and shallow coastal areas. The gray is found from northern California south through Baja California and into the Gulf of California. The brown is found from Oregon through Baja California, both reach lengths up to about 100 cm, but the gray can exceed this length.

SICKLEFIN SMOOTHBOUND *Mustelus lunulatus* is similar to the gray smoothhound, but differs by having small points on the teeth, and an elongated lower lobe of the tail. It is found from southern California through Baja California and into the Gulf of California. Reaches 175 cm in length.

SOUPFIN SHARK *Galeorhinus galeus* (choice 21', pg. 209) is a free-swimming species and not a bottom-dweller. This coastal species is found worldwide, but in our area from British Columbia through Baja California. It attains a length up to 200 cm.

REQUIEM SHARKS (CARCHARHINIDAE)

BLUE SHARK *Prionace glauca* (choice 23, pg. 209) has a long snout, a slender body, long, narrow pectoral fins, and a low, rounded dorsal fin. Upper teeth are strongly serrated and curve back. An oceanic species found worldwide, but in our area occurs near shore from the Gulf of Alaska to the Equator. Reaches to nearly 400 cm in length.

NARROWTOOTH SHARK *Carcharhinus remotus* (choice 24, pg. 209) has a relatively short but pointed snout, and narrow curved teeth that have fine serrations. It is a coastal species found worldwide. In our area it occurs from southern California to the Gulf of California, but most common from central Baja California to the Gulf. Reaches 300 cm in length.

DUSKY SHARK *Carcharhinus obscurus* (choice 24', pg. 209) has a rounded snout, fins with dark edges, a narrow ridge between the dorsal fins, and serrated triangular teeth that curve back slightly. A coastal species, it is found world wide. In our area, it occurs from southern California through to the Gulf of California, but most commonly from central Baja California to the Gulf. It reaches about 360 cm in length.

PACIFIC SHARPNOSE SHARK *Rhizoprionodon longurio* (choice 23', pg. 209) has a long, pointed snout and relatively small fins. The teeth are short and pointed, and are not serrated. This is a shallow-water species found from southern California through to the Gulf of California, but most common from central Baja California to the Gulf. Reaches 100 cm in length.

Two other species that may be encountered in our area are the **BULL SHARK** *Carcharhinus leucas*, which is characterized by a blunt snout, a heavy body, and large, triangular teeth (reaches 350 cm in length); and the **BLACKTIP SHARK** *Carcharhinus limbatus*, a tropical species recognized by the black tips of the pectoral, pelvic, and anal fins (reaches 180 cm in length).

BOOKS AND ARTICLES WITH ADDITIONAL INFORMATION ABOUT SHARKS/RAYS

Castro, J.I. 1983. The Sharks of North American Waters. The W.L. Moody, Jr., Natural History Series, Number 5. Texas A & M Press, College Station, Texas. 180 pp.

Compagno, L.J.V. 1984. Sharks of the World. An Annotated and Illustrated Catalogue of Shark Species Known to Date. Parts 1 & 2. Synopsis 125 (1-2):1-655. United Nations, Food and Agricultural Organization, Fisheries, Rome.

Eschmeyer, W.N., E.S. Herald, and H. Hammann. 1983. A Field Guide to Pacific Coast Fishes of North America. Peterson Field Guide Series. Houghton Mifflin Company, Boston. 336 pp.

Miller, D.J. and R.N. Lea. 1972. Guide to Coastal Marine Fishes of California. Department of Fish and Game, Fish Bulletin 157:1-235

Robins, C.R., et al. 1991. AFF Special Publication 20.

Springer, V.G. & J.P. Gold. 1989. *Sharks in Question*. Smithsonian Institution Press, Washington D.C. 170 pp.

Thomson, D.A. and N. McKibbin. 1981. *Gulf of California Fishwatcher's Guide*. Golden Puffer Press, Tuscon. 75 pp.

ACKNOWLEDGEMENTS

This identification guide, including its revision, is based on the experience gained in conducting a large and successful beached bird census program, that of PRBO International Biological Research. Early in this effort, the need for an identification guide became apparent. The beach censuses themselves were conducted by about 200 volunteers over a 14-year period. It was through interactions with them that we have learned about the circumstances that make various species difficult to identify in the hand. Many of these people also used, and tested for us, a preliminary draft of the guide. Their efforts have been indispensable. We would especially like to thank the following persons for their valuable criticisms of the earlier draft:

Stephen Bailey, Joan Breece, Jane Church, Roger Clapp, David Clark, Deborah Clark, Patrice Daley, William Eastman, Robert Lea, Joseph Gnagey, Janet Hamber, Bill Harrington-Tweit, Steve Howell, Dorothy Hunt, Joseph Jehl, Bernadene Logan, Flora MacIise, Mary Mayer, Jan Roletto, Dave Shuford, David M. Smith, Nancy Spear, David W. Vollmer, Edna Vollmer, Terry Wahl, Jay Watson.

An invaluable aid in the preparation of the keys were the bird, mammal and reptile collections at the Museum of Vertebrate Zoology, University of California, Berkeley; Department of Birds and Mammals, California Academy of Sciences; and the U.S. National Museum of Natural History. We appreciate the help of V.M. Dziadosz, N.K. Johnson, L.C. Binford, L.F. Baptista and S.L. Olson, from those institutions.

We gratefully thank Judith Bausor Ingram, Bernadene L. Logan, Katie Merriman, Merrilyn C. Smith and Lauren Hartz-Lewis, who aided in preparing the manuscript.

The actual writing and preparation of the guide was funded by a contract from the Office of Biological Services, U.S. Fish and Wildlife Service, and the Gulf of the Farallones National Marine Sanctuary, National Oceanic and Atmospheric Administration. Dr. Jay F. Watson and Jan Roletto of those offices, respectively, worked closely with us and provided much encouragement and assistance.

The first edition of this guide constituted the final report of the Pacific Seabird Group's Working Group on Beached Bird Surveys. The revised edition is contribution No. 609 of PRBO.

INDEX TO SPECIES

BIRDS

Actitis macularia, see SPOTTED SANDPIPER

Aechmophorus clarkii, see CLARK'S GREBE

occidentalis, see WESTERN GREBE

Aethia cristatella, see CRESTED AUKLET

pusilla, see LEAST AUKLET

pygmaea, see WHISKERED AUKLET

ALBATROSS 22

BLACK-FOOTED 31, 78, 80, 119, 128

LAYSAN 31, 79, 128

SHORT-TAILED 31, 78, 128

Anas acuta, see PINTAIL, NORTHERN

americana, see AMERICAN WIGEON

clypeata, see NORTHERN SHOVELER

crecca, see GREEN-WINGED TEAL

cyanoptera, see CINNAMON TEAL

discors, see BLUE-WINGED TEAL

penelope, see EURASIAN WIGEON

platyrhynchos, see MALLARD

querquedula, see GARGANEY

strepera, see GADWALL

Anser albifrons, see GREATER WHITE-FRONTED GOOSE

Chen caerulescens, see SNOW GOOSE

Aphriza virgata, see SURFBIRD

Arctocephalus townsendi, see GUADALUPE FUR SEAL

Arenaria interpres, see RUDDY TURNSTONE

melanocephala, see BLACK TURNSTONE

AUKLET, CASSIN'S 73, 113, 124, 159-60

CRESTED 75, 113, 160

LEAST 73, 113, 160

PARAKEET 75, 113, 160

RHINOCEROS 72, 112, 124, 160

WHISKERED 74, 113, 160

AVOCET, AMERICAN 47, 102, 144

Aythya affinis, see LESSER SCAUP

americana, see REDHEAD

collaris, see RING-NECKED DUCK

marila, see GREATER SCAUP

valisineria, see CANVASBACK

BOOBY, BLUE-FACED, see MASKED BOOBY

BLUE-FOOTED 37, 83, 135

- BROWN 36, 37, 83, 135
 MASKED 37, 83, 135
 RED-FOOTED 36, 37, 83, 121, 135
Brachyrhamphus brevirostre, see KITTLITZ'S MURRELET
 marmoratus, see MARBLED MURRELET
 BRANT (BLACK) 40, 88, 137, 138
Branta bernicla, see BRANT
 canadensis, see CANADA GOOSE
Bucephala albeola, see BUFFLEHEAD
 clangula, see COMMON GOLDENEYE
 islandica, see BARROW'S GOLDENEYE
 BUFFLEHEAD 45, 93, 94, 141
Calidris acuminata, see SHARP-TAILED SANDPIPER
 alba, see SANDERLING
 alpina, see DUNLIN
 bairdii, see BAIRD'S SANDPIPER
 canutus, see RED KNOT
 ferruginea, see CURLEW SANDPIPER
 fuscicollis, see WHITE-RUMPED SANDPIPER
 mauri, see WESTERN SANDPIPER
 melanotos, see PECTORAL SANDPIPER
 minutilla, see LEAST SANDPIPER
 pusilla, see SEMIPALMATED SANDPIPER
 ptilocnemis, see ROCK SANDPIPER
 ruficollis, see RUFOUS-NECKED STINT
Calonectris leucomelas, see STREAKED SHEARWATER
 CANVASBACK 42, 91, 92, 140
Catharacta macormicki, see SKUA (cf.) SOUTH POLAR SKUA
Catoptrophorus semipalmatus, see WILLET
Cephus columba, see PIGEON GUILLEMOT
 grylle, see BLACK GUILLEMOT
Cerorhinca monocerata, see RHINOCEROS AUKLET
Charadrius alexandrinus, see SNOWY PLOVER
 montanus, see MOUNTAIN PLOVER
 semipalmatus, see SEMIPALMATED PLOVER
 vociferus, see KILLDEER
 wilsonia, see WILSON'S PLOVER
Chen rossii, see ROSS' GOOSE
Chlidonias niger, see BLACK TERN
Clangula hyemalis, see OLDSQUAW
 COOT, AMERICAN 9, 25, 98, 117, 143
 CORMORANT, BRANDT'S 8, 38, 84, 85, 116, 121, 136
 DOUBLE-CRESTED 38, 84, 85, 136
 PELAGIC 38, 84, 85, 136

- RED-FACED 38, 84, 136
- CURLEW, BRISTLE-THIGHED 49, 102, 146
- LONG-BILLED 49, 102, 145, 146
- Cyclorhynchus psittacula*, see PARAKEET AUKLET
- Cygnus buccinator*, see TRUMPETER SWAN
- columbianus, see WHISTLING SWAN
- Diomedea albatrus*, see SHORT-TAILED ALBATROSS
- immutabilis, see LAYSAN ALBATROSS
- nigripes, see BLACK-FOOTED ALBATROSS
- DOVE, ROCK 9, 155
- DOWITCHER, LONG-BILLED 50, 101, 148
- SHORT-BILLED 50, 101, 148
- DUCK, HARLEQUIN 42, 46, 93, 94, 141
- RING-NECKED 140
- RUDDY 40, 93, 94, 142
- DUNLIN 6, 48, 52, 53, 103, 122, 144, 150
- EGRETS 9
- EIDER, COMMON 42, 43, 96, 97, 142
- KING 42, 43, 96, 97, 142
- SPECTACLED 42, 43, 96, 97, 142
- STELLER'S 42, 46, 96, 97, 139, 141
- Fratercula cirrhata*, see TUFTED PUFFIN
- corniculata, see HORNED PUFFIN
- Fregata magnificens*, see MAGNIFICENT FRIGATEBIRD
- minor, GREATER FRIGATEBIRD, see MAGNIFICENT FRIGATEBIRD
- FRIGATEBIRD, MAGNIFICENT 22, 79, 121, 137
- GREATER 137
- Fulica americana*, see AMERICAN COOT
- FULMAR, NORTHERN 34, 80, 104, 115, 129, 130
- SOUTHERN 129
- Fulmarus glacialis*, see NORTHERN FULMAR
- glacialoides, see SOUTHERN FULMAR
- GADWALL 45, 89, 90, 139
- Gallinago*, see COMMON SNIPES
- GARGANEY, see BLUE-WINGED TEAL
- Gavia adamsii*, see YELLOW-BILLED LOON
- arctica, see ARCTIC LOON
- immer, see COMMON LOON
- pacifica, see PACIFIC LOON
- stellata, see RED-THROATED LOON
- Gelochelidon nilotica*, see GULL-BILLED TERN
- GODWIT, BAR-TAILED 49, 102, 145, 146
- MARbled 49, 102, 122, 144, 145, 146
- GOLDENEYE, BARROW'S 44, 93, 94, 141

- GOLDENEYE, BARROW'S 44, 93, 94, 141
COMMON 44, 93, 94, 141
- GOOSE, BLUE 40, 138
CANADA 40, 88, 134, 138
EMPEROR 40, 88, 138
SNOW 39, 40, 87, 138
ROSS' 39, 87, 138
GREATER WHITE-FRONTED 40, 88, 138
- GREBE, CLARK'S 30, 77, 127
EARED 30, 77, 127
HORNED 30, 77, 127
PIED-BILLED 30, 77, 127
RED-NECKED 30, 77, 127
WESTERN 30, 77, 117, 118, 127
- GUILLEMOT, BLACK 69, 111, 158
PIGEON 72, 111, 116, 124, 158
- GULL, COMMON BLACK-HEADED 56, 58, 108, 153, 154
BONAPARTE'S 57, 108, 123, 153, 154, 155
CALIFORNIA 60, 63, 64, 106, 153
FRANKLIN'S 57, 59, 108, 154
GLAUCOUS 7, 64, 65, 105, 151
GLAUCOUS-WINGED 7, 59, 62, 105, 151-53
HEERMANN'S 64, 106, 123, 154
HERRING 7, 59, 61, 63, 64, 106, 151, 152, 153
IVORY 55, 59, 107, 154
LAUGHING 58, 108, 154
LESSER BLACK-BACKED 152
LITTLE 58, 59, 108, 154
MEW 60, 61, 107, 153
RING-BILLED 60, 61, 107, 153, 154
ROSS' 56, 57, 108, 155
SABINE'S 57, 59, 108, 155
SLATY-BACKED 60, 63, 152
THAYER'S 7, 59, 61, 62, 63, 64, 106, 151, 152, 153
WESTERN 7, 59, 60, 63, 64, 105, 115, 123, 134, 151-53
YELLOW-FOOTED 60, 63, 64, 152
- Haematopus bachmani*, see AMERICAN BLACK OYSTERCATCHER
*palliatu*s, see AMERICAN OYSTERCATCHER
- HERONS 9, 134
- Heteroscelus incanus*, see WANDERING TATTLER
- Himantopus mexicanus*, see BLACK-NECKED STILT
- Histrionicus*, see HARLEQUIN DUCK
- JAEGER, LONG-TAILED 55, 104, 151
PARASITIC 55, 104, 151

- POMARINE 55, 104, 123, 150-51
- KILLDEER 51, 99, 144, 145
- KITTIWAKE, BLACK-LEGGED 57, 58, 107, 154
- RED-LEGGED 58, 107, 154, 155
- KNOT, RED 53, 103, 148
- Larus argentatus*, see HERRING GULL
- atricilla*, see LAUGHING GULL
- californicus*, see CALIFORNIA GULL
- canus*, see MEW GULL
- delawarensis*, see RING-BILLED GULL
- fuscus*, see LESSER BLACK-BACKED GULL
- glaucescens*, see GLAUCOUS-WINGED GULL
- heermanni*, see HEERMANN'S GULL
- hyperboreus*, see GLAUCOUS GULL
- livens*, see YELLOW-FOOTED GULL
- minutus*, see LITTLE GULL
- occidentalis*, see WESTERN GULL
- philadelphia*, see BONAPARTE'S GULL
- pipixcan*, see FRANKLIN'S GULL
- ridibundus*, see COMMON BLACK-HEADED GULL
- schistisagus*, see SLATY-BACKED GULL
- thayerii*, see THAYER'S GULL
- Limnodromus griseus*, see SHORT-BILLED DOWITCHER
- scolopaceus*, see LONG-BILLED DOWITCHER
- Limosa fedoa*, see MARBLED GODWIT
- lapponica*, see BAR-TAILED GODWIT
- LOON, ARCTIC, see PACIFIC LOON
- COMMON 29, 76, 125-26
- PACIFIC 4, 29, 77, 114, 118, 126
- RED-THROATED 4, 29, 77, 126
- YELLOW-BILLED 29, 76, 126, 161
- MALLARD 42, 46, 89, 90, 138, 139, 141
- Melanitta deglandi*, see WHITE-WINGED SCOTER
- nigra*, see BLACK SCOTER
- perspicillata*, see SURF SCOTER
- MERGANSER, COMMON 44, 98, 142-43
- RED-BREASTED 44, 98, 142-43
- Mergus merganser*, see COMMON MERGANSER
- serrator*, see RED-BREASTED MERGANSER
- MURRE, COMMON 69, 70, 73, 74, 111, 113, 124, 158
- THICK-BILLED 69, 70, 73, 74, 111, 158
- MURRELET, ANCIENT 71, 73, 113, 124, 159
- CRAVERI'S 74, 113, 159
- KITTLITZ'S 74, 113, 159, 161

- MARbled 74, 75, 113, 159
 XANTUS' 71, 73, 113, 159
- Numenius americanus*, see LONG-BILLED CURLEW
phaeopus, see WHIMBREL
tahitiensis, see BRISTLE-THIGHED CURLEW
- Oceanites oceanicus*, see WILSON'S STORM-PETREL
- Oceanodroma castro*, see BAND-RUMPED STORM-PETREL
furcata, see FORK-TAILED STORM-PETREL
homochroa, see ASHY STORM-PETREL
leucorhoa, see LEACH'S STORM-PETREL
melania, see BLACK STORM-PETREL
microsoma, see LEAST STORM-PETREL
tethys, see WEDGE-RUMPED STORM-PETREL
- OLDSQUAW 40, 41, 93, 94, 141
- Oxyura jamaicensis*, see RUDDY DUCK
- OYSTERCATCHER, AMERICAN 47, 100, 143
 AMERICAN BLACK 47, 100, 117, 143
- Pagophila eburnea*, see IVORY GULL
- Pelecanus erythrorhynchos*, see AMERICAN WHITE PELICAN
occidentalis, see BROWN PELICAN
- PELICAN, AMERICAN WHITE 22, 134
 BROWN 22, 120, 135
- PETREL, CAPE 80
 COOK'S 36, 80, 129-30
 MOTTLED 36, 80, 129
 MURPHY'S 36, 130
 STEJNEGER'S, see COOK'S PETREL
- Phaethon aethereus*, see RED-BILLED TROPICBIRD
- Phalacrocorax auritus*, see DOUBLE-CRESTED CORMORANT
pelagicus, see PELAGIC CORMORANT
penicillatus, see BRANDT'S CORMORANT
urile, see RED-FACED CORMORANT
- PHALAROPE, RED 52, 53, 100, 147
 RED-NECKED 52, 53, 100, 147
 WILSON'S 50, 53, 100, 147
- Phalaropus fulicaria*, see RED PHALAROPE
lobatus, see RED-NECKED PHALAROPE
tricolor, see WILSON'S PHALAROPE
- Philacte canagica*, see EMPEROR GOOSE
- PIGEONS 9, 155
- PINTAIL, NORTHERN 46, 89, 90, 140
- PLOVER, AMERICAN GOLDEN 50, 99, 144
 PACIFIC GOLDEN, see AMERICAN GOLDEN PLOVER
 BLACK-BELLIED 47, 51, 99, 144

- MOUNTAIN 52, 99, 145
 SEMIPALMATED 52, 99, 144-45
 SNOWY 52, 99, 145
 WILSON'S 53, 99, 145
Pluvialis dominica, see AMERICAN GOLDEN PLOVER
fluva, see PACIFIC GOLDEN PLOVER
squatarola, see BLACK-BELLIED PLOVER
Podiceps auritus, see HORNED GREBE
griseus, see RED-NECKED GREBE
nigricollis, see EARED GREBE
Podilymbus podiceps, see PIED-BILLED GREBE
Polysticta stelleri, see STELLER'S EIDER
Pterodroma cookii, see COOK'S PETREL
inexpectata, see MOTTLED PETREL
longirostris, see COOK'S PETREL
ultima, see MURPHY'S PETREL
Ptychoramphus aleuticus, see CASSIN'S AUKLET
 PUFFIN, HORNED 72, 111, 112, 160-61
 TUFTED 72, 112, 160, 161
Puffinus bulleri, see BULLER'S SHEARWATER
carneipes, see FLESH-FOOTED SHEARWATER
creatorpus, see PINK-SHEARWATER
griseus, see SOOTY SHEARWATER
newelli, see TOWNSEND'S SHEARWATER
opisthomelas, see BLACK-VENTED SHEARWATER
puffinus, see MANX SHEARWATER
townsendi, see TOWNSEND'S SHEARWATER
tenuirostris, see SHORT-TAILED SHEARWATER
 RAILS 9, 143
Recurvirostra americana, see AMERICAN AVOCET
 REDHEAD 42, 91, 92, 140
Rhodostethia rosea, see ROSS' GULL
Rissa brevirostris, see RED-LEGGED KITTIWAKE
tridactyla, see BLACK-LEGGED KITTIWAKE
Rynchops nigra, see BLACK SKIMMER
 SANDERLING 52, 53, 103, 148
 SANDPIPER, BAIRD'S 54, 103, 149, 150
 CURLEW 54, 103, 150
 LEAST 54, 103, 145, 148-49
 PECTORAL 48, 51, 103, 149
 ROCK 54, 103, 149-50
 SEMIPALMATED 54, 103, 148-49
 SHARP-TAILED 50, 103, 149
 SPOTTED 51, 101, 146-47

- WESTERN 54, 103, 148-149
 WHITE-RUMPED 54, 103, 149
 SCAUP, GREATER 43, 91, 92, 141
 LESSER 43, 91, 92, 141
 SCOTER, BLACK 41, 95, 97, 142
 SURF 41, 95, 97, 116, 122, 142
 WHITE-WINGED 44, 95, 97, 142
 SHEARWATER, BLACK-VENTED 35, 81, 130, 131-32
 BULLER'S 35, 81, 130, 131
 FLESH-FOOTED 35, 81, 130, 154
 MANX 35, 131-32
 NEWELL'S, see TOWNSEND'S SHEARWATER
 PINK-FOOTED 35, 81, 130
 SHORT-TAILED 35, 80, 81, 131
 SOOTY 35, 81, 119, 130, 131
 STREAKED 35, 130, 131
 TOWNSEND'S, see MANX SHEARWATER
 WEDGED-TAILED 81
 SHOVELER, NORTHERN 45, 91, 92, 140
 SKIMMER, BLACK 66, 109, 156, 157
 SKUA (SOUTH POLAR) 13, 55, 104, 115, 150
 SNIPE, COMMON 49, 101, 148
Somateria fischeri, see SPECTACLED EIDER
 mollissima, see COMMON EIDER
 spectabilis, see KING EIDER
Stercorarius longicaudus, see LONG-TAILED JAEGER
 parasiticus, see PARASITIC JAEGER
 pomarinus, see POMARINE JAEGER
Sterna antillarum, see LEAST TERN
 aleutica, see ALEUTIAN TERN
 anaethetus, see BRIDLED TERN
 caspia, see CASPIAN TERN
 elegans, see ELEGANT TERN
 forsteri, see FORSTER'S TERN
 fuscata, see SOOTY TERN
 hirundo, see COMMON TERN
 maxima, see ROYAL TERN
 paradisaea, see ARCTIC TERN
 STILT, BLACK-NECKED 47, 102, 144
 STINT, RUFOUS-NECKED 54, 103, 148-49
 STORKS 9
 STORM-PETREL, ASHY 34, 82, 133
 BAND-RUMPED 32, 33, 82, 133
 BLACK 31, 82, 133

- FORK-TAILED 31, 80, 82, 119, 132
 LEACH'S 32, 33, 34, 82, 132-33
 LEAST 34, 82, 133
 WEDGE-RUMPED 32, 33, 82, 133-34
 WILSON'S 32, 33, 82, 134
Sula dactylatra, see MASKED BOOBY
leucogaster, see BROWN BOOBY
neboxii, see BLUE-FOOTED BOOBY
sula, see RED-FOOTED BOOBY
 SURFBIRD 53, 100, 148
 SWAN, TRUMPETER 39, 86, 137
 TUNDRA 39, 86, 137
Synthliboramphus antiquus, see ANCIENT MURRELET
craveri, see CRAVERI'S MURRELET
hypoleucus, see XANTUS' MURRELET
 TATTLER, WANDERING 50, 101, 147
 TEAL, BLUE-WINGED 45, 89, 90, 139-40
 CINNAMON 45, 89, 90, 139-40
 GREEN-WINGED 46, 89, 90, 139
 TERN, ALEUTIAN 67, 110, 156
 ARCTIC 68, 110, 156
 BLACK 65, 110, 117, 157
 BRIDLED, see SOOTY TERN
 CASPIAN 66, 109, 123, 134, 157
 COMMON 68, 110, 156
 ELEGANT 67, 109, 157
 FORSTER'S 67, 110, 156
 GULL-BILLED 66, 110, 155-56
 LEAST 67, 110, 157
 ROYAL 66, 109, 157
 SOOTY 65, 66, 110, 156
Tringa flavipes, see LESSER YELLOWLEGS
melanoleuca, see GREATER YELLOWLEGS
 TROPICBIRD, RED-BILLED 26, 79, 134, 157
 TURNSTONE, BLACK 51, 100, 147
 RUDDY 48, 51, 100, 147
Uria aalge, see COMMON MURRE
lomvia, see THICK-BILLED MURRE
 WHIMBREL 17, 49, 102, 146
 WIGEON, AMERICAN 46, 91, 92, 122, 140
 EURASIAN 140
 WILLET 47, 51, 101, 146
Xema sabini, see SABINE'S GULL

YELLOWLEGS, GREATER 49, 50, 101, 146
 LESSER 50, 101, 146, 147

MARINE MAMMALS

Balaena mysticetus, see BOWHEAD

Balaenoptera acutorostrata, see MINKE WHALE

borealis, see SEI WHALE

edeni, see BRYDE'S WHALE

musculus, see BLUE WHALE

physalus, see FIN WHALE

Barardius bairdii, see BEAKED WHALE

BELUGA 188, 194

BOWHEAD 182, 193

Callorhinus ursinus, see NORTHERN FUR SEAL

Delphinapterus leucas, see BELUGA

Delphinus delphis, see SHORT-BEAKED COMMON DOLPHIN

capensis, see LONG-BEAKED COMMON DOLPHIN

DOLPHIN, BOTTLENOSE 190, 195

LONG-BEAKED COMMON 190, 195

NORTHERN RIGHT WHALE 188, 194

PACIFIC WHITE-SIDED 190, 195

RISSO'S 185, 188, 195

ROUGH-TOOTHED 189, 195

SHORT-BEAKED COMMON, 190, 195

SPOTTED 190, 195

STRIPED 190, 195

Enhydra lutris, see NORTHERN SEA OTTER

l. nereis, see SOUTHERN SEA OTTER

Erignathus barbatus, see BEARDED SEAL

Eschrichtius robustus, see CALIFORNIA GRAY WHALE

Eubalaena glacialis, see NORTHERN RIGHT WHALE

Eumetopias jubatus, see STELLER SEA LION

FUR SEAL, GUADALUPE 175, 176, 181, 191

NORTHERN 175, 176, 181, 191

Globicephala macrorhynchus, see SHORT-FINNED PILOT WHALE

Grampus griseus, see RISSO'S DOLPHIN

Hyperoodon ampullatus, see BOTTLENOSE WHALE

HUMPBAC 183, 193

Kogia breviceps, see PYGMY SPERM WHALE

simus, see DWARF SPERM WHALE

Lagenorhynchus obliquidens, see PACIFIC WHITE-SIDED DOLPHIN

- Lissodelphis borealis*, see NORTHERN RIGHT WHALE DOLPHIN
Megaptera novaeangliae, see HUMPBACK
Mesoplodon spp., see BEAKED WHALES and BOTTLENOSE WHALES
Mirounga angustirostris, see NORTHERN ELEPHANT SEAL
Monodon monoceros, see NARWHAL
 NARWHAL 185, 188, 194
Odobenus rosmarus, see WALRUS
Orcinus orca, see KILLER WHALE
Phoca fasciata, see RIBBON SEAL
 hispidia, see RINGED SEAL
 largha, see LARGHA SEAL
 vitulina, see HARBOR SEAL
Phocoenoides dalli, see DALL'S PORPOISE
Phocoena, see HARBOR PORPOISE
Physeter macrocephalus, see SPERM WHALE
 PILOT WHALE, SHORT-FINNED 189, 195
 PORPOISE, DALL'S 189, 195
 HARBOR 190, 195
Pseudorca crassidens, see FALSE KILLER WHALE
 SEA LION, CALIFORNIA 169, 173, 174, 175, 181, 191
 STELLER 173, 174, 175, 180, 191
 SEA OTTER, NORTHERN 178, 179, 192
 SOUTHERN 178, 179, 181, 192
 SEAL, BEARDED 171, 176, 181, 192
 GUADALUPE FUR, see FUR SEAL
 HARBOR 177, 178, 181, 192
 LARGHA 178, 192
 NORTHERN ELEPHANT 168, 176, 180, 192
 NORTHERN FUR, see FUR SEAL
 RIBBON 177, 192
 RINGED 177, 181, 192
 SPOTTED, see LARGHA SEAL
Stenella spp., see SPOTTED and STRIPED DOLPHINS
Tursiops truncatus, see BOTTLENOSE DOLPHIN
 WALRUS 164, 165, 171, 191
 WHALE, BEAKED 185, 194
 BLUE 183, 193
 BOTTLENOSE 185, 194
 BOWHEAD 182, 193
 BRYDE'S 183, 193
 CALIFORNIA GRAY 182, 193
 CUVIER'S (GOOSE-BEAKED) 185, 194
 DWARF SPERM 184, 194
 FALSE KILLER 189, 195

FIN 184, 193
 HUMPBACK 183, 193
 KILLER 188, 195
 MINKE 183, 193
 NORTHERN RIGHT 182, 193
 PYGMY SPERM 184, 194
 SEI 183, 193
 SHORT-FINNED PILOT 189, 195
 SPERM 184, 194

Zalophus californianus, see CALIFORNIA SEA LION

Ziphius cavirostris, see GOOSE-BEAKED WHALE

SEA TURTLES, SHARKS AND RAYS

Alopias vulpinus, see THRESHER SHARK

Alopias superciliosus, see BIGEYE THRESHER

BONNETHEAD, see BONNETHEAD SHARK

Carcharhinus remotus, see NARROWTOOTH SHARK

Carcharhinus limbatus, see BLACKTIP SHARK

Carcharhinus obscurus, see DUSKY SHARK

Carcharhinus taurus, see BULL SHARK

Carcharodon carcharias, see WHITE SHARK

Caretta caretta, see LOGGERHEAD TURTLE

Cetorhinus maximus, see BASKING SHARK

Chelonia agassizii, see EASTERN PACIFIC GREEN TURTLE

Chelonia mydas agassizii, see EASTERN PACIFIC GREEN TURTLE

Dasyatis dipterura, see DIAMOND RAY

Dermochelys coriacea, see LEATHERBACK TURTLE

DOGFISH

SPINY 207, 211, 217

Eretmochelys imbricata, see HAWKSBILL TURTLE

Galeorhinus galeus, see SOUPFIN SHARK

GUITARFISH 206

BANDED 215

SHOVELNOSE 210, 215

Gymnura marmorata, see CALIFORNIA BUTTERFLY RAY

HAMMERHEAD

SCALLOPED 208, 211, 218

SMOOTH 208, 211, 218

Heterodontus francisci, see HORN SHARK

Hexanchus griseus, see SIXGILL SHARK

Isurus oxyrinchus, see MAKO SHARK

Lamna ditropis, see SALMON SHARK
Lepidochelys olivacea, see PACIFIC (OLIVE) RIDLEY TURTLE
Mustelus californicus, see GRAY SMOOTHHOUND
Mustelus henlei, see BROWN SMOOTHHOUND
Mustelus lunulatus, see SICKLEFIN SMOOTHHOUND
Myliobatis californica, see CALIFORNIA BAT RAY
Notorynchus maculatus, see SEVENGILL SHARK
Platyrrhinoidis triseriata, see CALIFORNIA THORNBACK
Prionace glauca, see BLUE SHARK
Raja binoculata, see BIG SKATE
 RAY,

CALIFORNIA BAT 207, 210, 216
 CALIFORNIA BUTTERFLY 207, 210, 216
 COWNOSE 216

Rhincodon typus, see WHALE SHARK
Rhinobatos productus, see SHOVELNOSE GUITARFISH
Rhinoptera steindachneri, see COWNOSE RAY
Rhizoprionodon longurio, see PACIFIC SHARPNOSE SHARK
 SHARK

BASKING 208, 212, 218
 BIGEYE THRESHER 218
 BLACKTIP 220
 BLUE 209, 214, 220
 BONNETHEAD 218
 BULL 220
 DUSKY 209, 214, 220
 HORN 207, 211, 217
 LEOPARD 209, 213, 219
 NARROWTOOTH 209, 214, 220
 PACIFIC ANGEL 206, 210, 217
 PACIFIC SHARPNOSE 209, 214, 220
 PACIFIC SLEEPER 217
 SALMON 208, 212, 219
 SOUPFIN 209, 213, 219
 SEVENGILL 207, 211, 217
 SHORTFIN MAKO 208, 212, 218-19
 SIXGILL 217
 THRESHER 207, 211, 218
 WHALE 218
 WHITE 208, 212, 219

SKATE 206

BIG 210, 215

SMOOTHHOUND

GRAY 209, 213, 219

BROWN 209, 213, 219

SICKLEFIN 219

STINGRAY

DIAMOND 216

ROUND 207, 210, 216

Somniosus pacificus, see PACIFIC SLEEPER SHARK

Sphyrna zygaena, see SMOOTH HAMMERHEAD

Sphyrna lewini, see SCALLOPED HAMMERHEAD

Sphyrna tiburo, see BONNETHEAD

Squalus acanthias, see SPINY DOGFISH

Torpedo californica, see PACIFIC ELECTRIC RAY

THORNBACK 206

CALIFORNIA 210, 215

TURTLE

HAWKSBILL 201, 202, 203-04

EASTERN PACIFIC GREEN 202, 203, 204

LEATHERBACK 201, 202, 203

LOGGERHEAD 202, 203, 204

PACIFIC (OLIVE) RIDLEY 202, 203, 204

Triakis semifasciata, see LEOPARD SHARK

Urolophus halleri, see ROUND STINGRAY

Zapteryx exasperata, see BANDED GUITARFISH

RECEIVED

AUG 25 1994

UNITED STATES GOVERNMENT
DEPOSITORY